









AN

✦ ILLUSTRATED ✦ WEEKLY ✦ MAGAZINE ✦

FOR THE

ARCHITECT, ENGINEER, ARCHÆOLOGIST, CONSTRUCTOR,
SANITARY REFORMER, AND ART-LOVER.

CONDUCTED BY

H. H. STATHAM,

FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

"Every man's proper mansion-house, and home, being the theater of his hospitality, the seat of self-fruition, the comfortablest part of his own life, the noblest of his sonne's inheritance, a kinde of private princedome, nay, to the possessors thereof, an epitome of the whole world, may well deserve, by these attributes, according to the degree of the master, to be decently and delightfully adorned."

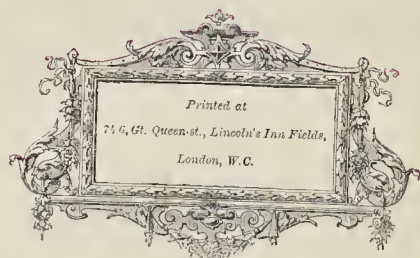
"Architecture can want no commendation, where there are noble men, or noble mindes."—SIR HENRY WOTTON.

"Our English word TO BUILD is the Anglo-Saxon *Btikan*, to confirm, to establish, to make firm and sure and fast, to consolidate, to strengthen; and is applicable to all other things as well as to dwelling-places."—DIVERSIONS OF PURLEY.

"Always be ready to speak your mind, and a base man will avoid you."—WILLIAM BLAKE.

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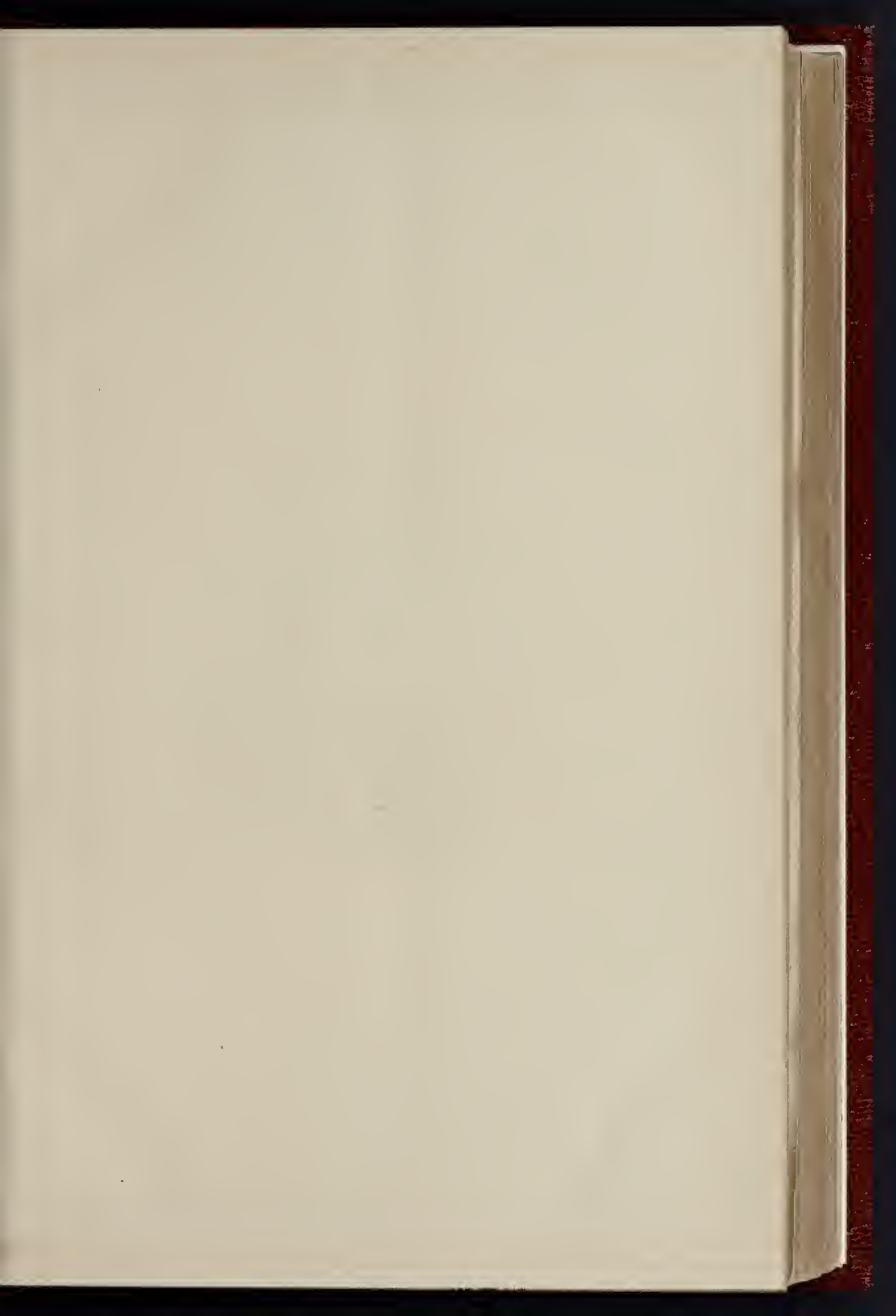
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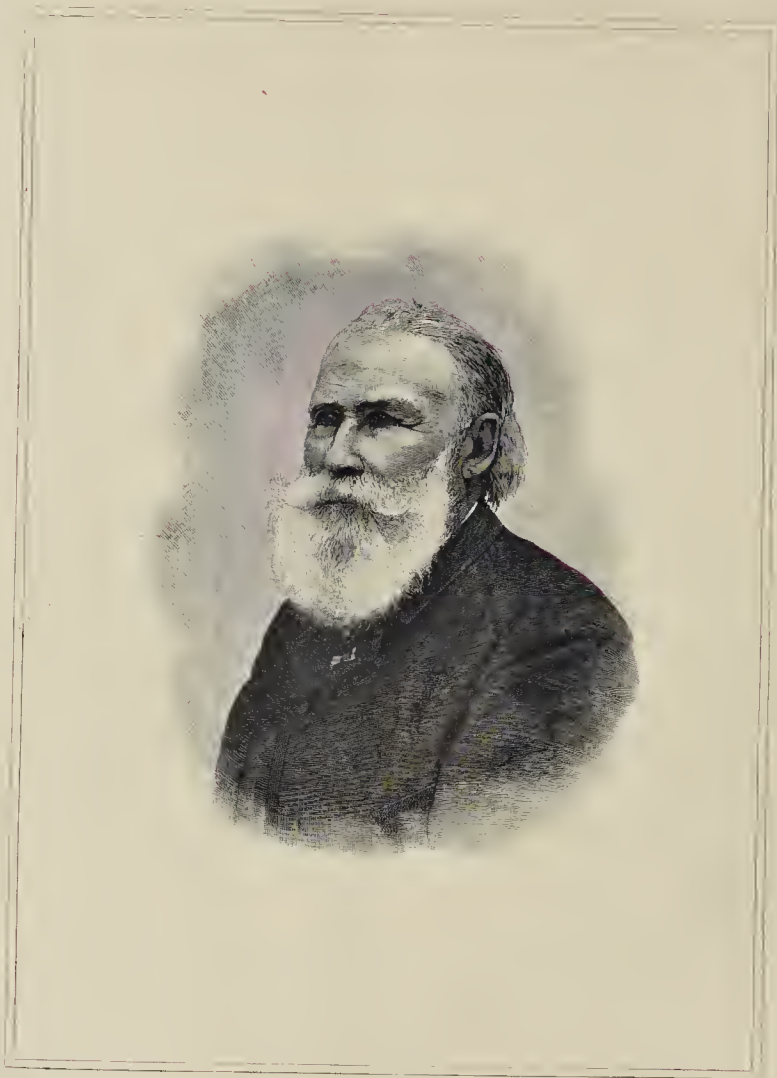
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M. César Daly,

ROYAL GOLD MEDALLIST, INSTITUTE OF ARCHITECTS, 1892.



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Old Drawings at the Institute.



THE selection of architectural drawings lent to the Institute of Architects from the Duke of Devonshire's collection, and which have been on view at their rooms during the week, includes not only drawings which, as Mr. Crace pointed out in his notes on them read on Monday evening, are of value historically, as records of the state of some ancient buildings at the time the drawings were made, but others which are interesting as showing the manner in which such architects as Palladio and Inigo Jones experimented with the materials of Classical architecture which in their day formed the only recognised and orthodox source of inspiration for the architect.

The drawings are a rather heterogeneous collection, and only a small proportion of them show any remarkable excellence or finish as drawings, they are mostly (those which are exhibited at least) slightly made studies of an architectural idea; and as very few have either signature or title appended it is not easy to particularise them. As far as those by Inigo Jones are concerned, it is remarkable how much more interesting and original he is in his designs made as fancies and independent of practical requirements than in the designs for actual buildings which are included in the collection. His drawing of a *façade* of a mansion for "L^d Lincoln," for instance, is certainly not a very

attractive or interesting piece of architecture. It shows a central feature consisting of four engaged columns violently rusticated (as one may say), with round-headed windows between the columns, and on each wing of the structure a window with a pediment and flanked again by smaller strongly rusticated columns in the middle of a blank wall. The slope of the pediment over the central colonnade is repeated in parallel lines by the roof-slope of a larger mass of building faintly indicated in the rear. There is a certain power about the treatment of detail in the side windows—Inigo Jones generally managed to give his own character to his detail—but certainly on the whole this is not a very attractive piece of architecture. The set of drawings of imaginary scenes, some evidently intended for theatres, exhibit an amount of fancy and originality which makes a striking contrast with this prim work, and show that it was not for want of exuberance of fancy that Inigo Jones kept his designs for actual building so comparatively formal and restricted in style. This playing with the materials of Classical architecture in imaginary compositions, unrestricted by considerations of cost or practical utility, seems to have had a considerable attraction for the architects of the Italian Renaissance, and from Italy no doubt Inigo Jones acquired this taste. One of these drawings, apparently intended as an architectural scene for a theatre, exhibits an almost wild exuberance, and impresses one rather as if it were Hindu architecture with Classical detail. We look into an immense hypæthral hall, along the walls of which are ranged closely-spaced pilasters above which are great

brackets or consoles each surmounted by a seated statue, while from the face of each pilaster project a ponderous bracket-like fountain basin, above which is a cupid figure. All these figures and details seen in perspective have a remarkable effect of tumultuous richness of detail. The upper story of the walls, set rather back from the lower one, is of a more ordinary and formal type of Classic or rather Italian architecture, but at the further end of the hall we have a gallery boldly flying across the hall, supported on two elliptical arches, and with a return gallery seen in perspective further on. The whole is a very remarkable bit of ideal architectural composition. Another very dignified though less original composition shows a kind of double portico of great columns on each side of the foreground, beyond which the side walls of the composition recede, and in the distance is seen a repetition of the same features as those of the foreground. This contrast of the same design in foreground and distance is a rather favourite device in compositions of this class by Renaissance architects, and for a theatre scene it is a remarkably effective means of giving extent of perspective and throwing back the scene from the eye; the large columns in the foreground impress by their size, the little ones in the distance, obviously on the same scale and forming part of the same design, impress one with the idea of the large space intervening between them and the foreground architecture. Another drawing of this kind shows a hall with figures against the walls, and the cornice brought out above each figure in a kind of projecting canopy, in a manner which no Renaissance architect would ever have

attempted in actual work. The floor here is represented as a sumptuously inlaid one of marble, and a circular temple or shrine closes the vista.

A pretty large series of drawings of Classic capitals in pen and ink, with no signature or title, evidently represents a series of experiments in variations on the Classic capital. They are rather coarsely and hurriedly drawn, and no attempt is made at any new leafage form, the variations consisting chiefly in the manner in which conventional figures or animals are worked into the design. In one odd example snails are introduced as angle objects under the volutes, the spiral lines of the shells abutting against the capital, and the heads of the snails protruding beneath the volutes; not a very happy idea. In another birds are introduced beneath the volutes, the birds being perched on the thin edge of the acanthus leaves beneath them. A better attempt shows the introduction of two nude figures back-to-back, stretching outwards from the centre of the face of the capital, and with one hand raised grasping the stem of the volute. This composes well and makes a good and spirited design sufficiently architectural in character. Another new idea is the employment of a second moulding round the capital, two-thirds up the height and parallel with the crowning moulding; above the acanthus leaves are introduced, and below it the surface is left nearly bare except for two back-to-back figures in the centre of the face. This division of the classic capital by a second moulding affords a suggestion of which something more may be made. In another of these sketches we have apparently an attempt to realise the mythical origin of the Corinthian capital as a basket of flowers, the greater part of the height being represented as imitative of basket-work, while a bit of acanthus leaf sticks out here and there, and some are seen projecting from the top. The sketch certainly serves to show the inadequacy of this old Vitruvian notion of the origin of the capital. But there are some available ideas among these sketches, and they serve at least as a reminder of the possibility of evoking a new treatment of the Classic capital.

Among the drawings exhibited in the Library is one bearing Palladio's name, a geometrical drawing of a facade with a Roman Doric order below and a Corinthian one above. It is noticeable that Palladio here employs the Roman Doric without any base, as in Greek work. There is a finely executed drawing here of what is evidently intended as an architectural theatre scene, with two streets diverging from the back of the scene, radiating from the supposed position of the spectator, so that we look up both of them. The foreground buildings on the right are powerfully designed, and the whole drawing very carefully executed. But by far the most beautiful drawing among these is one representing apparently a monument, shown in a geometrical elevation lightly and delicately tinted with the brush. There is an order of two large Corinthian columns on each side, between which is a niche with a small pediment over it containing a graceful fully-draped female figure. The columns support an entablature with a curved pediment broken in the centre, and against the two sections of the pediment are seated two charmingly-designed female figures, on a smaller scale than the one in the niche, and used in a purely decorative manner. Both in refinement of execution and grace of design this is a remarkable drawing.

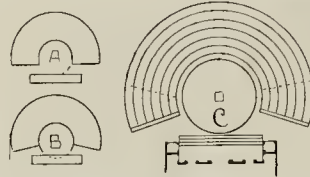
The drawings represent, we believe, only a small proportion of what is evidently a remarkable and most interesting collection. Some of those which were placed at the disposal of the Institute could not be safely exhibited owing to their insecure mounting, but these serve to show that the collection as a whole would be well worth exhibition on some occasion when there was time and opportunity to take better means for securing the drawings from any possible injury by placing them under glass. The historical interest of some of them was sufficiently

adverted to in Mr. Grace's notes read at the meeting; in adding some further remarks we have looked rather to their artistic interest.

THE BRADFELD GREEK PLAY.

THE third of what we hope may be considered to be the annual performances of Greek plays by the pupils of Bradfield College, in an open-air theatre constructed on the Greek model, took place on Tuesday, Thursday, and Saturday last week. The play was this year the *Agamemnon* of Æschylus, given (of course) in the original Greek, but with a certain number of cuts, chiefly out of the choruses, in concession to the supposed patience (or impatience) of a modern audience. Our impression is that the majority of the audience (we can speak for some, at all events) would have been quite content to have had the play in its entirety; and in regard to the statement that care had been taken to retain passages "which were either essential to the play or of acknowledged beauty," we should rather demur to the omission of the celebrated passage about the lion-cub reared in the household, certainly one of the most characteristic in the play, and which was once made the occasion of a kind of rival exhibition of translations, wherein Mr. Gladstone came off best.

This, however, is "literature," of which we do not profess to speak; our concern is with the artistic and architectural aspect of the celebration. The latter has some special interest at present, in reference to recent controversies as to the construction of the Greek theatre, as it affords an opportunity of studying the relation of the plan of the Greek theatre to its actual use. There may be said to be two recognisable forms of Greek theatre plan; one in which the auditorium and the orchestra space are finished with a semicircle on the side furthest from the scene, and the ends of the seats cut off on a line parallel with the proscenium, as at A, the line of the



semicircle generally being continued forward a little, as a tangent to the semicircle, towards the proscenium, as in diagram A, so as to give more room in both auditorium and orchestra. The other is the one shown in diagram B, in which the line of seats and orchestra includes a larger portion of the circle, and the wing walls bounding the ends of the seats are oblique to the front line of the proscenium, and sometimes, but not always, radiate from the centre from which the curve is struck. Dr. Gray, the Warden of Bradfield College, has adopted an arrangement which is again a modification of this last one, in keeping the proscenium a little farther back from the orchestra and making the orchestra a complete circle sunk one step below the lowest step of the auditorium, as shown at C, which is a rough sketch plan (from memory) of the general arrangement of the Bradfield theatre. We are not aware of any ancient example for this arrangement of a complete circular pit in the orchestra space; nor is it indicated in the description of the Greek Theatre by Vitruvius. It has the disadvantage, in regard to appearance, that it seems to detach the chorus a little too decidedly from the front of the scene; on the other hand, it makes a good guiding line for any evolutions of the chorus in the shape of a circular dance or walk round, which was a good deal employed in the performance of *Agamemnon*, the chorus

occasionally forming a double file going round the circle in opposite directions, one within the other, which has a very pretty effect. A practical disadvantage of the continuation of the curve of the seats beyond the semicircle,—a disadvantage which must have existed in some at least of the ancient Greek theatres of which the plan has been made out,—is that the portion of the audiences in the spaces at the ends of the seats, within the dotted lines on C, cannot see the stage well; and accordingly on Saturday, the day we had the pleasure of attending, it might have been observed that those portions of the seats were empty. Possibly this may be taken by some as a fact in favour of what we may call the Dörpfeldian heresy, viz.: that the principal actors all acted in the orchestra with the chorus, as the orchestra is visible from all the seats. Greek theatres, however, were not all planned in this way; in some of them the seats certainly finished parallel with the line of the proscenium; but in any case all we should argue from this disposition of the seats is that those who planned a theatre in this way were anxious to accommodate as many as possible, and that some persons who could find no other seats preferred to see the chorus and their evolutions rather than see nothing.

At Bradfield the connexion between the scene and the orchestra has been modified this year in accordance with what may now be taken as the ascertained discovery at Megalopolis of the three upper steps running right across the scene from side to side. Previously the connexion, at Bradfield, was by two short flights of steps one at each extremity of the scene, and fronting the orchestra; they would in fact have formed the end portions of the present broad flight, which has been formed by continuing the line of the original steps across the central portion of the proscenium. There is no reason to suppose that in all Greek theatres the steps were as at Megalopolis; but certainly we should say, taking the performance of last week as a test, that no arrangement could lend itself so well to this form of dramatic entertainment, in which the chorus are locally and aesthetically separated from the principal actors, and yet in relation with them in carrying on or commenting on the narrative, and occasionally for a moment coming in touch with them in the action. Thus, when the dying exclamation of Agamemnon is heard behind the scene, the chorus of "Elders" can evince their excitement and anxiety by mounting the steps to get nearer the house, in their desire to ascertain what has happened, without cutting themselves off from their proper territory in the orchestra, to which they retire again without disorder, on the entrance of Clytemnestra and Ægisthus.

We give a slight and hasty sketch of the front of the theatre. The entrances on to the scene are at the centre and from the side wings; the more usual arrangement of a centre and two side doors in the back wall of the scene is hinted at in the openings between the pilasters on each side, which however are not "practicable" entrances, being screened off behind and occupied, as indicated, by the pedestals bearing the huete of Aphrodite (we presume) and Apollo, to the latter of whom Cassandra had to appeal in the latter portion of the play. The architectural details of the back wall of the scene have been carefully studied, except that the profile of the capitals of the pilasters seems rather doubtful; the mouldings are painted with a surface ornament in orthodox fashion. It is a pity that the front portion of the erection has hardly received the same consideration as to detail; the long posts with their rude bases at the foot are not very Greek in suggestion; the entablature over the opening is treated with a very thin architrave and very deep frieze, in which the shallow sinkings between the sculptured panels seem like a modern carpenter's reminiscence of the triglyph groovings, but do not really resemble that or any other Greek detail. The figures on the pediment, taken from various well-known Greek figures, are painted in light

red. The curious pulpit-like erection, with battlements, between the posts on the left-hand of the scene, does duty as the watchman's post of observation in the opening scene, whence he sees the heacon - fires announcing the capture of Troy; but it is rather too Medieval in appearance. The flute-player and harpist who accompanied the singing and evolutions of this chorus were seated in the corresponding space between the posts on the right; this answered very well, though it would hardly, we should imagine, have been the position occupied by the musicians in a real Greek theatre. However, the modern harp is so entirely distinct from any instrument known to the Greeks, that it would be impossible to pretend to carry out verisimilitude in a detail of this kind. The music composed for the chorus by the Rev. J. Powley, the precentor of the college, happily combined the desiderata of being agreeable to the modern musical ear while preserving a certain degree of antique suggestion, and the chorus went through their singing in a very satisfactory manner.

The seats for the audience are finished with rough concrete, and are wide enough to allow plenty of room from back to front; the audience were provided (according to ancient usage, we are told) with small cushions handed to them on the way to the theatre. The chorus entered, according to tradition, by the space between the end of the auditorium seats and the scene building; the back portion of the erection forms a large room for the actors, occupying the place which in an ancient theatre would have been occupied by the columns hall which afforded, when necessary, a temporary shelter from rain, and also probably a meeting place for sauntering and discussion before and after the play, or at the interval between two plays, if the whole of a trilogy was gone through in one day. The dresses were mostly very good, and agreeable in colour effect, that of Clytemnestra being perhaps the only exception in the latter particular. The acting was meritorious as a whole; that of Mr. Blagden as Clytemnestra in many points exceedingly good, especially at the point where Clytemnestra goes down on her knees to Zeus in front of the scene, after she has persuaded Agamemnon to enter the house, in a brief invocation somewhat in the spirit of that in *The Critic*:-

"Grant all our ends,
And sanctify whatever means we use
To gain them."

Clytemnestra moreover had the great merit of pronouncing all her words clearly and distinctly. The Warden of the College, to

whom we owe the whole inception of the scheme, appears also to add histrionic ability to his other acquirements, judging from the readiness with which, after acting as a dignified leader of the chorus (Choragus) for most of the afternoon, he suddenly slipped into the dress and into the exceedingly different demeanour of the guilty Agisthus, in order to supply the place of an actor who was ill.

Such an unusual experience as an open-air play in this country suggests one or two observations as to the experiment, apart from its archaeological aspect. We were surprised to find how clearly and easily the actors could be heard, even from a position somewhat far back in the auditorium, the wooden erection of the scene no doubt helping much to reinforce the voices. The singing of the birds in the surrounding trees made a charming accompaniment to the play; and the experiment has even its sanitary aspect, a suggestion which we owe to a lady in the audience, who observed that in an ordinary theatre she certainly could not have sat for two hours and a-half on a seat without a back to it without feeling fatigued, and attributed this freedom from fatigue (probably rightly) to the fact of sitting in a pure atmosphere instead of having to contend against the debilitating effect of the vitiated air of our ordinary theatres (as they are, not as they might be).

The new chapel at Bradfield College, not yet completed, was one of the accessory sights to which the attention of visitors was directed. Mr. John O. Scott is the architect. The chapel is a Gothic building with narrow side-aisles for passage, the arcades carried on dark marble cylindrical shafts, which somehow seem to have a little too much the proportion, and consequent suggestion to the mind at first glance, of iron columns. Of course the object is to keep them as thin as possible, in order to avoid interference with access to the seats, and perhaps this is most easily done by a circular shaft. The east end is at present not completed as ultimately intended, but we rather regret that an east window of such very bad and raw colour should be erected there even as a temporary one; it is not good for the education of the sense of colour, of which English boys (and men) have generally little enough by nature.

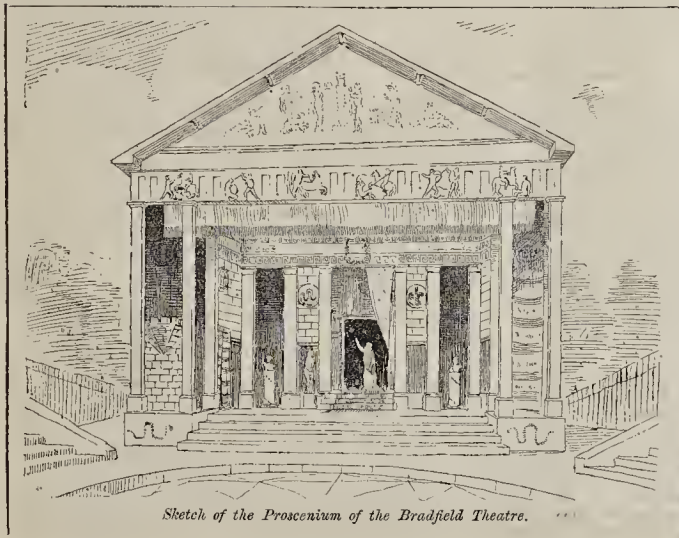
The quadrangle (open on one side) formed by the college buildings, apparently erected at different times and in various phases of modern Gothic, makes a pretty and picturesque architectural group, with that semi-domestic aspect proper to a school-building; a humanising contrast to the prison-like architecture of a French Lycée.

NOTES.

THE new scheme for a street from Holborn to the Strand, as now recommended by the Improvement Committee of the County Council, is the best which has yet been suggested, and has much to recommend it both in a practical and an architectural sense.

The Committee propose a street 100 ft. wide running in a straight line from the point in Holborn nearly opposite Southampton-row down to St. Mary's church; just above the church the road divides right and left and descends by an easy gradient each way into the Strand, a considerable nearly semi-circular space being cleared north of the church for this purpose. These bifurcated roads are bounded by a terrace wall north of the church, leaving a wide space between the terrace wall and the church for eastward traffic along the Strand, the westward traffic going by the present road south of the church. Half way up the new street a wide circus is formed, which is axial with the south roadway of Lincoln's Inn-fields and is connected with it. Westward, or rather south-westward, a fairly wide road branches off down to the foot of Bow-street, by widening Russell-street (flanking Drury-lane Theatre) Kemble-street and Sardinia-street. A parallel south-western road is formed below this, connecting the south-west angle of Lincoln's Inn-fields with Catherine-street, by widening White Hart-street, Blackmoor-street, and Clare-street. The objection to this is that the approach from the Strand by Catherine-street is had, and it is running down a wide street into a narrow one. A wide approach from Holborn to Lincoln's Inn-fields is proposed at Great Turnstile, and the lower part of Southampton-row is to be opened by removing the existing block of building between that and Kingsgate-street. The widening of Surrey-street, giving a better connection with the Thames Embankment and Temple Station, is also part of the scheme. The main line of street will avoid direct interference with Lincoln's Inn-fields, which is a recommendation, but another merit of the scheme is that it recognises architectural effect. It makes St. Mary-le-Strand a central architectural object at the foot of the street, visible from Holborn, while the central circus will be a good position for a monument or fountain on the axis of the street. The report, we are glad to see, refers to the former clamour for the removal of St. Mary-le-Strand as "an act of vandalism which would now be received with public indignation." We hope so, but it has taken a good deal of trouble to screw public opinion up to that point of aestheticism.

A COMMITTEE of the House of Lords last week passed the Bill of the Manchester, Sheffield, and Lincolnshire Railway Company. The new line will therefore be made, and a new terminal station will, sooner or later, be erected in London. What the financial success of the new main line to the North will be time only can show. But we cannot regard the scheme as likely to bring in for many years more than a very moderate profit, if indeed the concern shows any profit at all. Another Committee of the Lords dealt a different measure to the Bill for a tramway over Westminster Bridge and along a part of the Embankment, as far as Charing Cross. The Committee rejected the Bill: but there is no doubt that it is only a question of time how soon a tramway will be made on the Embankment, much to the convenience of the public. But the rejection of this Bill calls attention to the existing anomaly whereby a measure which has been carefully investigated and passed by a Committee of the House of Commons, may yet be rejected by a Committee of the House of Lords, in no way superior in general capacity or business knowledge. The time has arrived when Bills should be investigated by one Committee only. This double investigation is, at the best, a cause of great expense, as in the case of the Manchester and Sheffield Bill, and of some injustice to the community, as in the case of



the Tramway Bill. There is no reason why a particular class of Private Bills should not be allotted to the House of Lords, and other classes to the House of Commons, or why mixed Committees of members of the two Houses should not be formed. The present practice has nothing in its favour. It is quite a different matter in the case of political and general measures, in which the criticism of the House of Lords is often of great value.

A PAPER on "Some Disputed Points in Railway-bridge Designing," read by Prof. J. A. L. Waddell before the American Society of Civil Engineers, and published in their "Transactions" for last February, not only contains much that is worthy of careful study, but it has been the means of promoting an important discussion on many of those questions about which bridge engineers are not at present agreed. The subject of the paper is naturally one well adapted for debate,—in fact, the chief object of the author was to induce those who had made a special study of bridge superstructures to give the Society the advantages of their experience, and he succeeded so well in this respect that no less than forty members contributed at considerable length to the discussion, which, taken together with the paper, may be regarded as exhibiting what at the present day is considered to be the best American bridge-building practice. In Prof. Waddell's opinion there appears but little doubt that mild steel will in a very short time entirely supersede iron for structural purposes, and this view seemed to be shared by nearly all who spoke during the discussion of his paper. Any one who has calculated the stresses in the members of an ordinary pin-jointed truss will remember sadly the tediousness of the usual operation of taking different concentrated weights on the wheels of the locomotives, instead of the method generally adopted in this country of computing the stresses on the assumption that the rolling load is of a uniform amount per foot run. Prof. Waddell strongly advocates this latter method, which he considers sufficiently accurate for all practical purposes. The author also deals with wind pressure, safe working stresses, and the best form of floor system to use; and when it is remembered that all these subjects were fully discussed at the meeting by many of the most eminent American engineers, it will be acknowledged that the paper must contain much that is of value to all who are interested in bridge-designing.

THE May number of the *Journal of the Franklin Institute* contained a very practical lecture, delivered by Mr. Wm. L. Saunders, C.E., on compressed air. The author draws attention to the fact that the whole question of compressed air economy is based upon its economy of production and its economy of use, since the loss during transmission should be extremely small, and ought not to exceed 5 per cent. The largest compressed air plant in America is that at the Chapin mines in Michigan, where the power is obtained from a waterfall, and transmitted three miles, with a loss of only 2 lb., as shown by the gauges. In another instance the author states that air at 60 lb. pressure was conveyed two miles through a 5½ in. diameter pipe without any loss that could be measured by ordinary means. Notwithstanding these good results, the loss of power in general practice, where compressed air is used to drive machinery in mines and tunnels, is about 60 to 70 per cent. when the air is transmitted far enough to lose its heat of compression, and is exhausted without reheating. If the air is reheated, however, much greater efficiency can be obtained, and, by combining the best system of reheating with the best air compressors, the loss should be reduced to 20 per cent. In England compressed air is not reheated when working rock drills and similar machinery, but it is certainly worth doing, since it can be done so easily. A large amount of attention has

been given to this means of transmitting power, and much information is contained in Professor Unwin's paper, published in vol. 95 of the "Proceedings of the Institute of Civil Engineers," and also in Professor Kennedy's report for the British Association, made in 1889, on the system of work in Paris, where compressed air is used very extensively.

IN the June number of the journal referred to in the foregoing "Notes" are three papers published under the electrical section which in their great variety illustrate the versatility of American sciences. The first of these papers, on the "Constant Shunt Method of Measuring Large Continuous Currents," though marred by careless printing, is a useful account of a valuable method of obtaining accurate results without the use of the numerous and expensive instruments which would be needed for the exact measurement, by direct means, of currents varying greatly in magnitude. The theory of the method is fully set forth and the precautions necessary against various possible sources of error are clearly explained. The paper is at once unpretentious, practical and truly scientific. The last of the three, whilst far more ambitious in its tone, is far less valuable in practice. It treats of the calculation of the speed, the strength of field, and the number of conductors in the armatures. It evades calculations of an extremely elementary kind by means of a chart, whose use would generally be found more troublesome than the calculations it is intended to supersede, while the real difficulties of the problems connected with dynamo design are left untouched. Still, this paper attempts, at least, to deal with a practical question. Sandwiched between the two is a speculative contribution on "Cerebral Radiation," whose connexion with electrical science is only to be discovered in the fancied resemblance of these hypothetical radiations to the Hertzian electrical radiations, of which so much was made a year or so ago. This paper, however, has attracted far more attention than either of the others in the technical press on both sides of the Atlantic, and, which is more extraordinary, has been generally taken seriously. The idea of cerebral radiation is, of course, by no means new. Twenty years ago the *Spectator*, which has always shown a hankering after the pseudo-scientific, published an article on "Brain-waves," and, five years later, a similar article appeared in a Melbourne periodical, and it is probable that the notion will be found,—like the ethereal vibrations of which it treats,—periodic in time and space. The origin of the whole thing may, no doubt, be traced to the poet's lines,—

Star to star vibrates light; may soul to soul
Strike through a finer element of her own?
So,—from afar,—touch us at once?

A scientific meeting, of course,—like a joint-stock company,—has no "soul," and the "finer element" seems superfluous to those who think in terms of matter and ether; but it is supposed to possess brains, steeped in ether. Hence the poet's pretty fancy is vulgarised into a scientific (?) explanation of thought-reading, telepathy, &c. To do Professor Houston justice, he has added several new developments to his predecessors' absurdities, of which the most conspicuous is the suggested phonographic-photography of thought. The paper is dated March 1, and its perusal inevitably suggests the thought that it was read just one month too soon.

HOLCROFT PRIORY, formerly Wimberley House, by the approach from London to the once village of Fulham, and now tenanted by the Sisters of the Holy Cross, will be put up for sale at the Mart on the 12th instant, for building purposes. It stands on the site of Claybrooke House, described in T. Faulkner's "Historical Account of Fulham," 1812. A house opposite, Holcroft's Hall, built circa 1708, was

occupied by Madame Vestris, and after her death there on August 8, 1856,—being then styled Gore Lodge,—by the late Charles Mathews. Within the past few years many of the detached houses along this road from Walham-green to Fulham have been cleared away, together with their gardens, for shops. Walham Lodge, the home of Brand, the eminent chemist and geologist, is represented by an "estate" so called. Percy Cross, renowned for its garden and the rare trees cultivated by Mr. Thomas Ord (*obit* 1814), has given place to a large brewery; Park House, by what was known otherwise as Purser's, or Pershouse, Cross, at the corner of the road to Parson's-green, has also disappeared. It was built by Holland, on the site of Quibus Hall, a seat of the Whartons. In the wall, facing the main road, was a stone inscribed, "Purser's Cross 7th August 1738", said to commemorate the felo-de-se and burial here of a highwayman. In a very old house opposite, formerly "Rosamund's Bower," and since Audley Cottage, lived T. Crofton Croker, F.S.A., author of the charming little book, "A Walk from London to Fulham," illustrated by F. W. Fairholt; Ivy Lodge, at the road's southern end, was the home of Rudolf Ackermann, the celebrated print-seller. The appearance of Parson's-green is much changed; the church stands on the site of the old rectory-house, which claimed to have been the home of Byfield, the Presbyterian army chaplain ridiculed in "Hudibras"; East End House, built by Sir Francis Cbild, founder of the bank at Temple Bar, at the end of the seventeenth century, and latterly the residence of Mrs. Fitzherbert and of Piccolomini, was pulled down in 1885; the "White Horse" public-house, marked by its sign hanging from a curious piece of iron work, has been rebuilt.

WE fear that the "International and Horticultural Exhibition" at Earl's Court, much as it has been trumpeted in the daily press, must be put down in the same category with the other shows which have successively occupied the ground at first laid out for the abortive American Exhibition. The great attraction announced was the laying out of plots of ground to show the manner of gardening at different times and in different countries; and this, if well done, would have been of great interest. A visit to it unfortunately shows that it is little better than a pretence, and we should conclude that the descriptions given in some of the daily papers of this part of the show must have been merely transferred from the puff paragraphs in the catalogus. The only two plots in which there is any pretence of doing this properly are the enclosures called the "Jacobean garden" and the "Italian garden," and these are only carried out in a slipshod manner. The Jacobean garden consists of a parterre, with a terraced bank on a small scale round it, laid out in a pattern; but the miniature borders are wretched little strings of green rather than borders, and a fully-equipped Jacobean parterre would be surrounded by clipped shrubs in pyramids or some alternating shapes, kept with the most scrupulous neatness. No one will get any true idea of a Jacobean garden from this imperfect sketch. The so-called Roman, Egyptian, and Elizabethan gardens are wretched little shams, in which paste-board architecture on a small scale makes the chief feature. To have carried out model gardens in different styles in an adequate manner would, no doubt, have been very costly, but it would have been worth going to see, which this is not. Within the large glass building there is a more extensive garden laid out in the English fashion, which means accident and not design, and with backgrounds of painted "landscape-garden" scenery; but there is an abundance of flowers and plants here, and it makes a very respectable kind of winter garden, if it were not spoiled by this painting of sham scenery and buildings which pervades the whole grounds. In the upper portion of this glass nave, nearer the entrance

are a certain number of practical exhibits. Messrs. Crompton & Fawkes exhibit their slow-combustion apparatus for hothouses; Messrs. Hemby & Co. a good class of split pine sun-blinds; a greenhouse is shown with Newton's "Reform" system of glazing (zinc vertical bars with condensation grooves, and no cross-bars); Deard's greenhouse, with non-transverse bars under the glass and light zinc vertical bars of a section forming a water channel; Bennett's miniature hothouse 7 ft. in length, certainly a notable article for the price at which it is offered, including a miniature heating apparatus; and examples of well-known types of iron-wire fencing, &c., and other articles, some of them not very directly connected with gardening. The small hothouse stated to be an exhibition of "carnivorous plants" seems to contain chiefly orchids, but makes a pretty little show. Generally speaking, however, the exhibition is just what its predecessors were, a popular tea-garden, with the pretence of an exhibition thrown in.

ALTHOUGH the Report of the evidence before the Royal Commission on London Water Supply could not fail to be interesting, one hardly expected it to be amusing. Yet we fear people of a satirical turn of mind might be tempted to find a good deal of amusement in the evidence by Mr. Gough on behalf of the Conservators of the Thames, reported in our last number. The whole tendency of this evidence is to show that the abstraction of such an enormous quantity of water from the river by the Water Companies is not in the least injurious to the state of the river, that they might even take more than they do now. The moving cause of this singular contention is that the Thames Conservancy gets 20,000*l.* a year from the Companies as compensation for the abstraction of this water, and does not want to lose it. And these are the "Conservators" of the Thames! This anxiety thus expressed to be allowed to water out of it would make a capital point for one of Mr. Gilbert's future comic operas.

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

PRESENTATION OF THE ROYAL GOLD MEDAL. THE sixteenth ordinary general meeting of this Institute was held on Monday evening last at Conduit-street, Mr. J. Macvicar Anderson, President, in the chair.

Mr. Alfred Waterhouse, R.A., said that before the business of the meeting was proceeded with, he thought it would be the desire of the members that they should sincerely thank the President and Mrs. Anderson for their kindness in entertaining them at the *conversations* held in the South Kensington Museum the other evening, and he moved a resolution to that effect.

Mr. Henry Currey seconded the motion, which was carried by acclamation, and the President said a few words in acknowledgment.

The Royal Gold Medal.

The President, in rising to present the Royal Gold Medal for Architecture, 1892, to M. César Daly, said:—Colleagues and Gentlemen,—It is an appropriate and a happy custom that the last meeting of our session should each year be devoted to the recognition of conspicuous merit and ability in connexion with our art. On the preceding meetings of the session we have been engaged in receiving information from specialists competent to communicate it, on one or other of the varied subjects of interest relating to architecture. But to-night we occupy more purely unselfish ground. We do not receive. It is our privilege to give. And, although the gift which we bestow is not our own, for it is conferred by her Majesty the Queen, yet the responsibility attaching to it is ours, inasmuch as we are graciously permitted to recommend to her Majesty the individual who in each year we deem to be the most fitting recipient of so high an honour. For forty-four years this distinction has been bestowed by our beloved Sovereign—whose prolonged

and beneficent reign will form the brightest and most lustrous page in English history—and I venture to think that our recalling the names of those eminent men which constitute the roll of Gold Medalists of the Royal Institute of British Architects, even our illustrious *confère* whom we are now met to honour will deem it no ordinary distinction that his name should be added to such a list. In the responsible exercise of our privilege we have for the last three years recommended to her Majesty the names of Englishmen whose high attainments we were thus proud to acknowledge. But it is one of the happy features characteristic of this royal gift that in our recommendation we recognise no merely local or metropolitan, or even national limit. The sphere of selection is as unrestricted as that of Art itself—it is the wide world. Wherever merit is conspicuous, he it amid the nationalities of the old, or among the republics of the new world, it is our ambition to recognise and to honour it. This consideration materially adds to the value of the honour. Were our Gold Medalists selected from among British architects only, the distinction no doubt would still be great of being one of a small hand chosen by their colleagues for outstanding merit; but it would be as nothing in comparison with what it is, when the field of selection embraces the peoples and the tongues of the whole earth. Gentlemen, we have this year recommended to the Queen the name of one who is a veteran in the world of art, a giant when measured by the products of his pen, one whom we Englishmen are proud to honour as a distinguished Frenchman, M. César Daly. Times there have been when our brilliant neighbours across the Channel were our rivals in more serious avocations than those which are associated with the arts of Peace. Thank God, those times are gone, let us hope never more to return. Happily when, in later years, they and we have had to fight, it has not been as combatants, but shoulder to shoulder, resisting the oppression of a common foe. Let us rejoice that our rivalries and our contentions are now confined to prosecuting such unwearied pursuits as tend to advance the civilisation of the world. We welcome our distinguished colleague as one who has thus nobly laboured. Few there are who will leave behind them so worthy a record of a long life unsparringly devoted to the advancement of Art. Few indeed who can point to such monuments of literary research as are embodied in the pages of the *Revue Générale de l'Architecture et des Travaux Publics*. Few are there who have found time and energy to publish such a series of important architectural works as *Motifs Historiques d'Architecture et de Sculpture d'Ornement*, *L'Architecture Privée au XIX^e Siècle*, *L'Architecture Française Contemporaine*, *Mobilier d'Eglises*, *Cours de Constructions*, and others of less importance, to say nothing of endless brochures and more fugitive essays which have emanated from his prolific imagination. Such a record as this, one would think, would be more than sufficient to satisfy the most ambitious author, but M. César Daly does not seem to be content to enjoy the repose which he has legitimately earned by a long-continued life of work, for I understand that he contemplates the compilation of no less a work than a Dictionary of Architecture. The mere suggestion of such a project being seriously entertained by an octogenarian, more particularly in view of the length of time and vast labour involved in the publication of our own Dictionary of Architecture but recently completed, command our unstinted admiration. With M. César Daly's permission, I venture, even in his presence, to refer to a few personal reminiscences, because in a career so active and so varied they cannot fail to be of general interest. Born in France in 1811, César Daly was brought at an early age to England, where he was educated, remaining till he was 15 years old, having commenced the study of drawing in his eighth year. It would thus appear that if the training of the boy has any influence on the career of the man, we may claim some credit for the success of our eminent colleague. Returning to France in 1826, he attended classes at the College of Douai; at 16 he joined the preparatory section of the Ecole Polytechnique, and at 17 carried off the first prize for drawing. His desire to enter the army having been frustrated, he entered the office of M. Mallet, an architect at Douai, continuing at the same time the study of higher mathematics with M. Avignon,

professor at the Ecole Polytechnique. He was nearly twenty, when, on the advice of his two masters, Mallet and Avignon, he left Douai for Paris, and entered the studio of M. Duban. He there acquired a somewhat exceptional position. French architects of that period neglected the study of mathematics, and evinced but little taste for travelling in their own country. Young Daly, on the contrary, lost no opportunity of utilising these means for the acquisition of knowledge. He took notes of all that he met with in his provincial tours that appeared to him to possess architectural interest, and the influence of such studies of old work was soon apparent in his compositions, which drew forth the congratulations of Duban, who, though a revered and respected master, honoured Daly by treating him more as a companion than a pupil. Lahrouste also showed him great kindness, and when, in 1839, César Daly established the *Revue Générale de l'Architecture*, which has now reached its fifty-second year of circulation, it was Lahrouste who designed the frontispiece. In 1843, M. César Daly was appointed diocesan architect of Alby, and fulfilled the duties of that office for twenty-five years. The restoration of the Cathedral of Alby, which he carried out, is a work of great architectural importance and interest, possessing exceptional merit, and earned for its author the official congratulations of the Minister of Education. The influence he exercised in the district on the mode of construction was considerable, and in 1861 he obtained the decoration of the Légion d'Honneur at the instance of the Archbishop and the Prefect of Alby. M. César Daly was the first, in 1848, to found a society for decorative or industrial artists engaged in designing for trade manufacturers, and he insisted on their admission to the societies representing the Fine Arts. "The society of the future," he said, "will be essentially industrial. Beware of turning aside public sympathy by disdaining those who would embellish trade with the attractions of Art. Let Art, on the contrary, penetrate everywhere, become a necessity, and be responsible, in the widest possible sense, for all distinction and dignity." In the same year he organised a meeting of architects, painters, sculptors, poets and critics in order to elect and send to the Constituent Assembly a representative, whose special province it would be, in all circumstances, to protect the interests of Art. The assembled artists, however, could not agree, each department refusing to the others any claim to the title of artist. Narrow-minded jealousy and deplorable ignorance rendered united action impossible, and M. Daly had to be content with recommending each section to meet independently, and appoint delegates to represent the Arts. At the meeting of architects he himself was elected, and we may rejoice that, having no wish to bury himself in a political assembly, he did not accept the nomination, preferring the freer life of traveller, student, architect, and journalist, from which the world has derived such great advantage. He was an original member of the Council of Architecture, founded by Ministerial decree in 1848, for the purpose of examining and approving the design and construction of ecclesiastical buildings, for which a grant was required from Government. He represented architecture in the Mexican Commission established during the Mexican War by Napoleon III., in which that monarch had sought to unite the most eminent *savants* of the time. In 1869 he visited Jerusalem for the purpose of exploration, and during his residence there was able to afford valuable assistance to the officers of the English Palestine Exploration Fund, at that time engaged in prosecuting their investigations. We cannot be surprised to learn that, in consequence of his constant journeys and the engrossing nature of his literary and archaeological pursuits, M. César Daly was compelled, at a comparatively early period in life, to renounce private practice, and to restrict his attention to works confided to him by Government. In the course of his journeys he travelled over the whole of Europe (with the exception of Russia), as well as in Turkey, Asia Minor, Syria, Palestine, Egypt, and the north of Africa, studying monuments and recording notes, most of which are still unedited. He spent three years in America, travelling in search of archaeological remains across the United States, Mexico, and Central America, and was the first to note, in 1856, the ruins of several pre-Columbian cities in Central America, which until then had been



almost ignored. A life which has thus, from childhood to old age, been devoted to study and the acquisition of knowledge, must needs present much that it would be interesting and profitable to narrate. I must, however, rest content with the brief sketch,—mesgre though it be,—to which I have been forced to restrict myself, satisfied that at least I have said enough to demonstrate that the career of M. César Daly has been one of constant activity and of generous devotion to the interests of art. At various periods of his life M. César Daly has been the recipient of many honorary distinctions. Among these I may refer to his being a Chevalier of the Legion of Honour; Commander of the Order of St. Stanislas of Russia; Commander of the Medjidid; Officer of the Order of the Saviour, of Greece; Knight of the Order of Christ, of Portugal. He is also a Foreign Member of the Royal Academy of Fine-Arts, Stockholm; an Honorary Associate Member of the Imperial Academy of St. Petersburg; an Associate Member of the Royal Academy of the Fine Arts, Belgium; a Member of the Royal Academy of the Fine Arts of the Netherlands; a Member of the Royal Academy of Lisbon; an Honorary Member of the American Institute of Architects; an Honorary Member of the Society for the Promotion of Architecture, Amsterdam; a Corresponding Associate Member of the Association of Portuguese Civil Architects, Lisbon; a Corresponding Member of the Academy of the Fine Arts of Florence; a Corresponding Member of the Archaeological Society of Athens; a Member of the Roman Academy of St. Luke; an Honorary Member of the Central Society of Belgium; an Honorary and Corresponding Member of the Royal Archaeological Institute of Great Britain and Ireland; the senior Honorary Corresponding Member of the Royal Institute of British Architects; and, lastly, a member, under various titles, of a series of learned societies in France.

Turning to, and addressing the honoured guest of the evening, the President said,—Monsieur César Daly, congratulating you, as I now do most heartily, on having produced so many works of literary merit tending to promote or facilitate the knowledge of architecture, and on having been the recipient of so many honours, deservedly conferred on you in the course of your exceptionally active career, I yet am encouraged to hope that this Royal Gold Medal, which it is my high privilege as President of the Royal Institute of British Architects to present to you [here the President invested M. Daly with the Medal, amidst the applause of the meeting], although the latest, will not be the least highly esteemed by you of those

honours which you possess, seeing that it is conferred by her most gracious Majesty the Queen, on the unanimous recommendation of those who are best able to judge of your merits as an author and an architect. Honoured Colleague, although you are one of the few now living who have been witnesses of most of the stirring events which have made this century famous, I yet indulge the earnest hope that it may please God to spare you still for some years of useful activity, and that thus the world of art and of letters may not be deprived of the advantage which it has hitherto enjoyed, of so unique and so illustrious an embodiment of indomitable industry, ripe experience, universal knowledge, and unquenchable energy. (The President's concluding remarks were heartily applauded.)

M. César Daly, who was greeted with hearty applause, and who spoke in English, said, in reply:—Most worthy and honoured President; ladies; gentlemen of the Council, nominated by your peers as the most apt to enlighten the general architectural mind and the general public on all matters concerning the progress of architecture and the rights and duties of the architect; Fellows, Associates, and aspirants, brothers in the great synthetic art of architecture, allow me to salute you all most cordially, most sympathetically, and also most gratefully. Your respected President asked if the last honour conferred upon me could rival those I have received in past times. Gentlemen, I know no greater honour than the one I have received this day. My first thoughts were cultivated on English soil; my first feelings were nurtured in the English spirit; my first efforts in the artistic line took place in England when I was a very young boy. I left England at the age of fourteen; but, gentlemen, I think that when the heart is in its proper place, grateful feelings to the country where one's first years are passed are never to be weakened. You may judge, then, how deep my feelings are at this moment. I am almost ashamed to show this weakness, but the fact is, that I do not feel strong. You are a virtue nation, and you are not fond of weakness being exposed; I know it, and if I could avoid it I would do so. Gentlemen, this medal, as it has two faces, has for me two characters. On one side is mentioned the foundation of this useful and noble Institute; on the other is the glorious effigy of your sovereign. There I see architecture,—English architecture,—and I see England itself. Wherever her sovereign rises before the eyes, you must see England, for the sovereign is the symbol of the nation. This has been perfectly understood in France, gentlemen. When I

was informed of your kind decision concerning this medal, the most considerable society of French architects, the Société Centrale, of Paris, addressed to me a letter of felicitation, and I can assure you that it was worded in such terms that every English patriot would have been flattered by it. Gentlemen, you have risen above all partiality. Art is for you beauty, and not only beauty in this land, or in that, but beauty over the whole world. Architecture is not merely an art; it is also a science and a labour of common sense, ministering to all the wants and the feelings of the civilised world. What, really, is architecture? If you will allow me a definition, I would say that architecture is the art of composing and executing public edifices and their surroundings,—public places, gardens, parks, &c.—so as to answer to the wants, the feelings, and the state of science and technical knowledge of the society in which the architect is at work. As in the world in general, gentlemen, you see one man takes to industry, another to science, a third to art, and so forth, so in architecture the modes of activity vary. Nature, nevertheless, has given to every man a head, a heart, and hands; that is to say, the instruments of thought, feeling, and action; and the grandeur of architecture consists in its reflecting human nature and human society. Architecture is a social art, and not the expression simply of individual feeling. When a society is in a primitive state, its wants are not very various; its feelings are coarse; its science is very limited; but as civilisation progresses, its wants become more complicated, the feelings much more refined, and the knowledge, scientific and technical, infinitely superior. There are utilitarian buildings and there are essentially æsthetic buildings. For instance, you want a stable. It requires an amount of experience to build a good stable, for a horse wants a certain *hygiène*, he wants certain sanitary surroundings,—in short, he wants a house properly made for him. That is a utilitarian work. But when you become impressed with a strong national feeling, desiring to make a national monument because you have had a very great triumph, it is no longer a utilitarian building you require, it is essentially an æsthetic one, and all the feelings of the human soul, all that the imagination can inspire, must be brought forward by the architect. Gentlemen, you have had recently discussions, the echo of which has reached the Continent. The question has been:—In our times, science and technical pursuits, have they not taken an influence that ought to be more limited? The æsthetic department, has it not been slightly neglected? I think, gentlemen, that this may be perfectly answered if

you take into account the actual state of civilisation. The whole world is in a transitory condition. In England, you have as many as 300 religions sects! Go back to the Middle Ages, and you had but one faith,—one God, and one law. Look at France: we have Republicans, we have Monarchists; among the latter we have Royalists, Legitimists, and Imperialists. The fact is, the old form of civilisation is crumbling down. How could the æsthetic department escape from this general transformation? Of course, architecture is a victim of this transitory state of society. It is not the fault of the architects; it is not the fault of architectural theory. It must be attributed to the social state, to the universal state, and what I say now of the English sectarian bodies,—300 of them,—we might say of the Buddhists, or of the Islamists. Everywhere you see the people asking for something else, for something new, or for some reform. We are in a state of metamorphosis. Science goes constantly ahead, because science is essentially the addition of the observations of one generation to the observations of all those which have gone before, so that science is eternally on the increase; art is not at all in the same condition. The æsthetic condition, on the contrary, changes with every grand social transformation, and that is the secret of this transformation of all architectural styles. You have had the polytheistic styles; they were all characterised by rectilinear lines and flat surfaces: think of Egypt and Greece. Then you come to the transitory state of Rome, when the arch was introduced, not only as a technical form, but as a form answering to the changed theory of the universe then coming forward gradually. At the origin of Greek civilisation, the universe was conceived as consisting of the firmament and the earth. The earth was regarded as a flat plain, and the firmament as a crystal cover that reposed upon it, and round the earth ran the æthereal river. Such was the astronomical conception of the old Greeks. But by nautical experience and the observations made in the old religious colleges, especially of Egypt and Chaldea,—I might call them observatories,—they arrived at this result,—that the earth could not be flat: that it was spherical, and that the heavens could not be a hemisphere, but must be a sphere. They then found that they required several spheres to explain the movements of the heavenly bodies, and they had successively seven, nine, and even more concentric spheres turning round. This polytheistic conception of the universe which lasted throughout all the centuries of the Middle Ages, and had an influence on the architectural mind of those ages, was overthrown by Copernicus in the sixteenth century only. The first forms that were considered as perfect were the triangle and the square, and then the double square. But Aristotle, in after ages, teaches that the most perfect forms are circular, and why so? He says that a straight line is never perfect, being extensible, whilst with the circle the starting-point is also the ending-point. Aristotle had an immense influence, but not precisely on the art of his time; in later ages his influence was very considerable upon the creation of the Byzantine style of architecture. His theory of the perfection of circular and spherical forms was taken up by the Christian fathers. The polytheists said that the planets were gods, and they were spherical bodies, and so, gradually, in the public mind the idea took birth that something sacred was attached to the spherical form, and the early Christians felt this influence, and recognised the sphere as the most perfect body, and Origen taught that the souls received in the arms of God must have a spherical form. Now, it is astonishing that when the Christian mind is invested with this idea, that the most perfect form is the spherical, that you come to the Byzantine style of architecture, wherein you see the house of God crowned by a hemisphere? This leads me into a splendid architectural question, if I am not detaining you too long. The fact is, gentlemen, I think there is a ground upon which a union might be established between science and æstheticism, notwithstanding what has been said by the discordant gentlemen who have been striving to throw science into the background. It is this: it is not, I think, that these eminent *conférenciers* are the enemies of science; they know perfectly well that, particularly to-day, we can do nothing very grand without science. We require an immense amount of science: we have new materials, we want

to cover immense spaces, all which requires science and technical knowledge in the highest degree. Consequently, I do not really think, at bottom, that those who have been striving against you are really the enemies of science and technical knowledge. Their real desire is to see a greater æsthetic preponderance in our architecture. There is something true, there is something just, in that demand. We must throw away false theory, and cultivate science and technology as the two arms of architecture; but I think, gentlemen, that we must also take into account that there is a poetical side to architecture that might be more assiduously cultivated. The poetical side of architecture can be exemplified very easily. Allow me to call to mind Trajan's Column at Rome. There is probably no gentleman here who has not copied Trajan's column. I recollect perfectly well when my master called upon me to copy the column. I copied it very carefully, but my master did not find great enthusiasm in me, and he asked me why I was so cool about it. I said, "Well, Sir, the fact is, I do not understand it!" "How!" he said. "You don't understand it? You don't see this triumphal bas-relief? That it was in honour of Trajan?" "Oh, yes! I understand that; but it is the column I do not understand. In a column, you have always taught us that the most expressive part is the *capit*, the head, the capital. Now, I see here the most modest capital that exists in the Orders of Architecture. You have been teaching us that the frustum may have no ornament at all, that fluting is already a great adornment, while here I see that all the ornament is on the frustum. I do not understand it." My master (Duhau) was a true artist, and he said, "Well, Dally, you have always been a very original lad; there is something in what you say." Years passed by, when in visiting a museum I saw one of those bush-like receptacles, several of which have been found in Herculaneum with papyrus rolled up in them. Well, the Director of the museum was opening one of these papyrus, and holding it up. I said, "God bless me! That is Trajan's column; that is the history of the Trajan war simply turned round. Trajan's column is a *column*, not a column! Everybody has been deceived by a false name! It is Trajan's historical *column* of his Dacian war was exposed to the view of the people who did not know common writing." Everybody can read painting or sculpture, and these were really the democratic popular writing in former days. In the Middle Ages our windows and walls were covered with paintings of saintly legends. The people could not read books, but they could read perfectly well the paintings on the glass and on the walls; and from time to time, from the pulpit, the priest would describe and expound them. Then the peasantry took an interest in architecture; but will you tell me to-day what peasantry take any interest in any architecture? I say, gentlemen, that we must do something to popularise architecture; and as I see we have here some kind ladies who have done us the honour to assist at this meeting, we must immediately invest them with a mission; they must help us to make architecture understood, not only as a useful building matter, but as a poetical form of art. Let us take another example of poetical architecture. I was speaking just now of the old pagan polytheistic idea of the heavens. Is it not possible to discover that idea in the Pantheon, the place where the whole of the gods were assembled? The vault of the Pantheon was nothing but the heavens themselves: it is Olympia, the dwelling-place, the house, of the gods, instead of being the house of a God. If you follow out that line of thought, you will see how Byzantine architecture found its birth in this conception, so gradually developed under very logical and true influences. Allow me to give you another example. It is an example which will interest the ladies present, because the discovery was made by a lady. We were discussing very warmly amongst ourselves some fifty years ago what might be the signification of the gargoyles to be seen on our cathedrals. I gave forth a theory, and was laughed at by my best friends. My theory was this: I considered the architect as a judge. He endows a figure with beauty, as he would, for instance, the figure of Christ, or he invests it with ugliness, as he always did the figure of the Devil. "Now," I said "what can you find more energetically expressed than this antithesis between the figure of God and the figure of the Devil?" Well, I say all that tends

towards the Divinity must be beautified by art, and all that tends towards the Devil must be uglified and marked by physical ugliness, as he is by moral imperfection. Now this is the very singular discovery made by the lady in question, who was a professor at the official school of St. Denis. She had read my conception of the gargoyles, and she wrote to me one day: "Sir, I can establish without the possibility of contradiction the truth of your theory." I went to see the lady. She was the daughter of an old Italian gentleman who had passed his life in the study of the holy fathers and the sacred writers of the Middle Ages, and for the first time in my life I heard mention made of Rhaban Maur, a writer of the thirteenth century. None of my friends knew anything about that writer: the fact is, he had been pretty generally lost sight of. This lady, brought up by this singular father, had studied the four towers of St. Denis—the four octagon towers, at the summit of which, at each corner, there is a gargoyle. But I have a preliminary observation to offer to make them understood. A young man enters into life, and in going through the course of his existence he must meet successively with all the passions that characterise or may assault the human soul. If he succumbs, he belongs to the Devil; if he vanquishes, he belongs to the Eternal Divine Being. Now, the first of these figures represents a young monk in the Benedictine costume. He is beginning the struggle of life, and he masters successively with Anger, Envy, Hypocrisy, Lubricity, and every other passion, and after having passed the four cardinal points, he comes to the last, and there, what do we see? We see an old monk with a bald head and a wrinkled forehead holding the Devil under his knees and crushing him: he has vanquished the Evil One. It is quite a poem. I published this lady's discovery in my *Revue*, with all the drawings of those horrible monsters whom the monk met on his road and vanquished. If we go a step further,—and I would not miss this last example of poetical architecture, because it is the work of an English architect: I do not know his name,—I would refer to a tomb that you have in the Abbey of Westminster. It is the tomb of the daughter of James the First of England and the Sixth of Scotland, and is in Henry VII.'s Chapel. It represents an infant in a cradle, and is made of most splendid marbles of every colour, representing the different matters that compose the cradle. You have the dark velvet mourning covering; you have the gilded embroideries; you have the little child with her head on the pillow, and you have the curved head of the cradle protecting the infant. In fact, this monument, looked upon alone, in any situation, would be very interesting, but it is further so in showing the influence of a lady,—probably of a mother's, thought. Now, have you never been visiting a lady when her child had just been put into the cradle, and was going to sleep? If so, you will have noticed that she invariably turns the face of the child towards the wall, so that the noise of any conversation that there may be in the room strikes not upon its ears, and so that its eyes escape the glare of the light. It is a little maternal attention which cannot have escaped your notice. This is exactly what has been done with the cradle-monument of the daughter of James the First. Instead of being placed so as to exhibit fully its æsthetic qualities, the face is turned to the wall. There is an amount of feeling in that monument which must attract the attention of every tender woman's heart, and especially the heart of every mother. Now, gentlemen, we are very powerful in science; never have we been more powerful in the constructive resources that industry and mines can furnish architects with; but are we not rather negligent with respect to the poetical fibre? I am speaking to Englishmen, and allow me to insist particularly upon it. Gentlemen, you are too frequently misunderstood on the Continent. This misunderstanding dies away rapidly, but still it exists. And there are prejudices amongst you, also, about the inhabitants of the Continent, and it will be so on both sides so long as frequentation is not more active. When we see more of each other we shall learn to know one another better, to respect one another, to borrow usefully from one another, and then, ultimately, to love one another; and then there will be no more of those dreadful national duels, in which hundreds of thousands of men are slain, causing poor mothers to lose their eyes with weeping,

poor girls to lose their lovers, young women to lose their husbands, and children to lose their fathers. This frightful, atrocious, and abominable system of national duelling between people and people must be stopped; we must make war upon War, and the best way to do it effectively is to learn to know and respect one another. Now, gentlemen, your language on the Continent, notwithstanding its glorious literature, is generally considered as a commercial business. Out of twenty persons who study English, nineteen study it for commercial purposes only. They learn to write and read commercial letters, but as for the æsthetic literature of the country they are far from being familiar with it. I am not going to praise you, but it is my thorough conviction that there never did exist a poetical lyre with so many chords as the English lyre. There is no single form of human feeling that is not represented by English poets. You are endowed with an immense poetical scope of feeling, expressed in many admirable creations, and, let me add, with a school of painting which, during the last two hundred years, has been so rapidly rising that it is often a matter of surprise on the Continent. Gentlemen, we have a new architectural world again opening before us. We are arriving at the end of the transitory state which has made our art suffer so deeply. Architecture is binding together its fragments. The different schools of architecture are no longer the enemies of one another; they borrow from one another. It is true they fall into a state of general eclecticism, but what does that signify? It signifies simply that they are no longer sectarian; they are in want of a new law to guide them. They have become all-tolerant, and they take the whole world as the architectural treasure that they have a right to enjoy and use. Well, gentlemen, I think that this is the opening of a new architectural world. I have not the slightest doubt about it myself. If I had time I would furnish you with superabundant proof, but I have already taken too many of your moments. Now, I say, the door is opening. You have a special genius, gentlemen, and you are called upon to test that genius that has been given you, and, at the same time that you are a practical, scientific people, to show also that in architecture you can be the poets that you have always shown yourselves in your literature. (Monsieur Daly resumed his seat amidst loud and long-continued applause, and during the course of his address his remarks were frequently warmly applauded, especially when he referred to international goodwill and friendship.)

The President: Gentlemen, we are in the habit of imagining that we have only one "Grand Old Man," who is constantly referred to as being unique in point of octogenarian energy. I think that after the remarkable speech to which we have had the privilege of listening to-night, we must be convinced that he has at least one competitor, and that competitor Monsieur César Daly.

The Burlington-Devonshire Collection of Drawings.

Mr. J. G. Crace and Mr. Wyatt Papworth subsequently enumerated the principal contents of the Burlington-Devonshire collection of drawings, kindly lent by the Duke of Devonshire. As the President explained in a few prefatory remarks, the drawings were preserved at Chiswick House, and were collected by the celebrated Earl of Burlington. The drawings, Mr. Crace said, are contained in seventeen portfolios and books of folio size bound in Russia or Morocco leather. Those in the portfolios are all mounted, apparently on foreign boards, and many of the sheets having sketches on both sides are attached to the boards at one end only, so as to leave the back free for inspection. The drawings have the lines in bistre, and some are shadowed with finely-drawn lines, others with wash tint. They are of two classes, either sketches from original monuments or designs, having dimensions and memoranda upon them; or drawings fairly made out, many of which are probably by another hand, as several are purely elementary drawings of the Orders, or plans of temples, sepulchres, and other edifices most likely prepared for publication. The signature of Palladio is not on any one of the drawings, though several of the mountings have his name, especially those of Penzance. Some have the name of the edifice to which they relate, others have no indication of the object they are meant to illus-

trate. Those which may be presumed to be by Palladio himself amounted to about two hundred and fifty. There is also a bound volume endorsed with the words "Heavenly Temples: Plans, Drawings, and Sections," but the drawings apparently are not by Palladio. It contains thirty-four full leaves (some inlaid) of plans of temples, principally circular; and a thick folio volume endorsed, "Drawings: Public Ornaments, Arches, and Bridges." The latter consists of seventy-two leaves of drawings by various artists. Among them are three of figure subjects; six richly decorated ceilings, apparently French, with the letter "L" in the panels; screen walls with statues in niches; fountains; archways; vases; a drawing entitled, in English, "The Original Drawing for ye Little but Beautifull Temple of St. Pietro Montorio in Rome," by Bramante; a tomb; Raphaelesque ornament, pilaster, and frieze; armor; wall decoration; ancient archways; and five sheets of sketches of designs for palaces in Vicenza and neighbourhood. The following three volumes have also been lent to the Institute:—A bound volume of "Vitruvius," folio, Como, 1521, by Cesare Cesarino, with MS. notes. A bound volume of "The Architecture of Palladio," folio, 1740, Venice; Italian and French text; a rare edition. A bound volume of "Vitruvius," quarto, Venice 1567, of great interest as containing numerous notes in the handwriting of Inigo Jones, with a written statement to that effect at the end by Lord Burlington. There are also four boxes, all of which contain drawings, chiefly by Inigo Jones, Webb, and other English architects; but several of Palladio's drawings are intermixed with them by accident. There are numerous scenes for masques, probably the work of Inigo Jones.

On the motion of the President, seconded by Mr. Alma Taverna, R.A., it was resolved to nominate the Duke of Devonshire for election as an Honorary Fellow of the Institute, and the meeting then resolved itself into a *conversazione* for the purpose of examining the drawings.

The last meeting of the session will be the adjourned general (business) meeting to be held on Monday, July 11.

CONGRESS OF FRENCH ARCHITECTS.

The twenty-first session of the Congress of French architects, which opened on the 20th ult., in the hémicycle of the Ecole des Beaux-Arts, had a special interest owing to the new movement for the concentration of professional forces from all parts of the kingdom, and the now almost complete organisation of the *Consortium* (the union of the departmental societies of architects). The preparation of the Congress was entrusted to a committee of delegates, consisting of representatives of the Société Centrale des Architectes, the Caisse de Défense Mutuelle, the Association Amicale des Architectes Diplômés, and of each departmental architectural society throughout France.

This Committee of about thirty members met at Paris for the first time on February 12 of this year, and held its last meeting on Saturday, the 18th inst., when it drew up, in conjunction with the Special Committee of the Société Centrale, the following programme for this Congress:—

Monday Afternoon, June 20: Opening of the Congress by M. Daumet, President of the Société Centrale. Nomination of Committees to resume the consideration of the three principal questions taken up last year: (1) Examination and refutation of the criticisms made on the work of architects and the accusations brought against them; (2) On the confusion created by certain legal decisions as between architect and contractor; (3) What drawings should the architect furnish to his client; and also of committees on various subjects—Provincial Architectural Museums; A Weekly Day of Rest; Hygiene of Towns and Public and Private Buildings, &c.

Tuesday and Wednesday Afternoons, June 21 and 22: Discussion of the above questions. Reading of an obituary notice of the late Antoine-Nicholas Bailly, by M. Loviot, Principal Secretary of the Société Centrale.

Friday Morning, June 24: Sitting of the Annual General Meeting and of the Committee of Administration of the Caisse de Défense Mutuelle; report on its operations for 1891-2 by Mr. Chas. Lucas, Secretary of the Committee; Election of Council, Officers, and Committee.

Friday Afternoon.—Election, by architects who are members of the Société Centrale, of the resident

and five non-resident members to form a special committee on the subject of a diploma for architects. Reports of committees on the three special questions referred to above, and of other committees.

Saturday Morning, June 25.—Taking of votes for the Diploma Committee.

Saturday Evening.—Distribution of medals awarded by the Société Centrale in Domestic Architecture, Jurisprudence, and Archaeology (Report by M. Paul Seillière, secretary of the jury); and of recompenses awarded to divers schools and to building employés (Report by M. F. Roux, joint secretary). Banquet at the Hôtel Continental.

The following visits were arranged for:—*Tuesday morning:* The Galleries Museum (architect, M. Guadet); The Comparative Museum of Architecture and Sculpture at the Trocadéro.

Wednesday morning: New Bureau de Travail (architect, M. Bourard); New Gallery of the Conservatoire des Arts et Métiers (architect, M. Ancelet).

Thursday: Excursion to Châlons-sur-Marne, under the guidance of the Architectural Society of the Marne department; including visit to the Cathedral of St. Etienne, the churches of Saint-Jean, Saint-Louis, Notre Dame, Saint Alpin, and the church of Vinez; the Seminary of the Prefecture, and the new Palais de Justice. Excursion to Nôtre Dame de l'Épître.

Saturday morning: New Hall of the Court of Appeal in the Palais de Justice at Paris (architect, M. Daumet).

Except in the case of the Caisse de Défense Mutuelle and the Diploma Committee, the sittings and discussions were held in the hémicycle of the Ecole des Beaux-Arts.

At the opening meeting on the 20th M. Daumet presided, and the bureau consisted of M. M. Herment and T. Guadet, Vice-Presidents of the Société Centrale; M. Journoud, President of the Society of Architects of Lyons; M. Mailleau, President of the Société Régionale du Nord, as Vice-President; A. Normand, and Paul Sedille, as Secretaries. M. F. Roux as Secretary. About 110 architects, of which about a score were from the provinces, attended at this sitting, which was opened by a very pleasant address from M. Daumet. He recalled the fact that the Congress had for twenty years met in this room, the work of Duban and Delaroché, and hoped that next year there would be erected, between the doors, a monument to Duban; he referred also to the loss they had sustained in the death of Bailly the President, and Monnier, the former Secretary of the Société Centrale. M. Daumet concluded his discourse by some indications as to the order of the day, and an allusion to the representations made by the central and provincial societies to the Government on the subject of the diffusion of architectural education in France by the reconstitution of the ancient provincial schools.

A discussion took place on the address, on the part of M. Chevallier (Nice), M. David (Penanrnn), M. Journoud (Lyons), and M. Joly, the latter reminding the meeting that on June 18 the Organisation Committee of the Congress had decided that this year the Congress should recommend certain propositions but not formally vote on them, leaving this till the method of voting had been settled, for next year, by the societies forming the Congress.

M. Boileau then read a *résumé* of the communications sent from three provincial Societies and the "Société des Architectes Diplômés" on the first question. "Examination and refutation of charges made against architects" which has been published in *L'Architecture*. Some observations were made on the subject by M. Gaston Héuard, in the name of the Association des Diplômés, M. Chevallier and M. Chas. Lucas, the latter representing the "Caisse de Défense Mutuelle," and the general opinion seemed to be that the "Caisse de Défense" should form a kind of Vigilance Committee to consider and answer such charges as might be made against architects and bring to light the truth where necessary; and M. Joly undertook, in conjunction with M. M. Aeb. Herment, Bartaumeux, Heret, and Lucas, to give this question definite and early consideration.

At the request of M. Lucas, M. Heret, President of the Committee of Jurisprudence and Hygiene of the Société Centrale, set forth the dangers to private property which might result from the new legislation contemplated by the Government for the protection of public health, and M. Achille Herment, in whose favour M. Daumet had vacated the chair, observed that in view of the future revision of the International Convention of Berne, it was necessary

to insist on the rights of the architect in regard to his works.

A discussion took place as to the date for a newly-proposed visit, viz., to see the model of the proposed Metropolitan railway prepared by M. Paul Haag, engineer of the Ponts and Chaussées Department, which was fixed for Thursday the 30th (for those who did not go to Chalons-sur-Marne). The sitting was closed at 5.30 p.m.

On Tuesday the 21st the sitting was opened at half-past three, under M. Journaud (president of the Société Académique de Lyons) in the chair. The report of the preceding meeting was read and confirmed, and it was announced by M. Lucas that the committee of the Caisse de Défense had claimed "urgency" for a meeting on Friday to consider the first question of the programme, already alluded to, refutation of the accusations against architects. Mr. Ronx read a notice on Chaudet, an architect recently deceased, who had left to the Société Centrale a part of his library and of his sketches in Greece. He recalled Chaudet's restoration of the Propylæa, and had procured him a prize at the Académie des Beaux-Arts in 1849, and which had been more or less adopted by many archaeologists.

The order of the day was the consideration of the second main question on the programme, "On the confusion created between the architect and the contractor by certain legal decisions, especially in regard to their joint responsibility ('solidarité')." M. Gaget read a very conscientious memoir in the name of the Société des Diplômés, showing that this idea of joint responsibility was fatal to the proper direction of the work, and equally unjust both to architect and contractor. His paper included an interesting study of the different aspects under which the execution of building work presents itself, and the present method of carrying out such work in France.

The President thanked the author of the paper, and then called on the Secretary to read, on the same subject, a memorial from the "Société Académique de l'Architecture" of Lyons, treating of the responsibility and joint relations of architect and contractor, and including a curious history of the construction of the large theatre at Bordeaux.

The sitting was terminated by the reading, by M. Batié, of a long memorial from the "Société Régionale des Architectes du Nord," including a study of the state of special jurisprudence since 1853, and of the position made for the architect by the civil code; an analysis of the principle of responsibility, which he considered ought to fall on the contractor alone, and a demand for distinction and not confusion of responsibility. The meeting separated at half-past five, after a notice that the discussion of this question would be opened by M. Ach. Hermant at the next day's meeting.

The third sitting was opened at 3.15 of June 22 at the Ecole des Beaux-Arts; M. Mondet, president of the Society of Architects of Bordeaux, in the chair. On the platform were also M. Dalaborde, perpetual secretary of the Académie des Beaux-Arts; and M. Corroyer, Inspector - General of Diocesan Buildings. After thanks had been voted to the architects of the buildings visited the day before (MM. Ginain, Bourdais, Bouvard, and Ancelet), M. Loviot read a notice on the life and works of the late M. Bailly. On the question of the programme: "On the confusion created by certain legal decisions," &c., M. Achille Hermant read a paper, the conclusion of which was that the architect is essentially a man who gives directions (*mandataire*), much more than an undertaker of building work (*locuteur d'ouvrage*); and that the existing law is right, but is sometimes badly interpreted. MM. Dancet, Mondet, and Deslignières asked if M. Hermant would draw up a résumé of all the communications made on the subject, which he undertook to do. M. Gaget referred to the importance attaching nowadays to the adjustment of the claims of contractors both in public and private works. M. David of Penanrnn treated of joint responsibility from the legal point of view; and M. Lucas read a paper showing that the architects of the last two centuries, in France, were not, in works of private architecture at least, by any means in the position of contractors.

The President then called on the consideration of question 3: "What drawings ought the architect to give his client?" M. Gaget read a paper on the subject in the name of the Société des Diplômés, and M. Lucas read a communi-

cation on the subject from Mr. W. H. White of London. The sitting terminated at 5.30.

At the meeting of Friday, June 24, the chair was occupied by M. Daumet. M. Lucas read the report of the annual general meeting of the Caisse de Défense Mutuelle, held that morning; and the council was elected for the ensuing year, comprising M. Daumet (president), MM. A. Hermant, Davert, and Dormoy (of Troyes) as vice-presidents; M. Barmann as treasurer, M. Lucas as secretary, M. J. Hermant as assistant secretary, and M. Joly "Commissaire des Comptes." M. Lucas analysed the contents of two communications which he had made in the name of the Société Centrale to the Congress of the Sorbonne, one on Professional Instruction, and the other on Francois Blondel, architect, engineer, sailor, soldier, statesman and professor of mathematics, first director of the Académie-Royale d'Architecture, architect of the Porte Saint-Denis at Paris, &c.

The meeting next listened to the reading of a long communication intended to be presented to the Minister of Public Instruction, on the subject of the creation of a system of architectural instruction for the provinces, the main propositions received the entire approval of many of the leading members present. M. Hermant then read a proposal made in the names of MM. Daumet, Joly, L. Etienne, Heret, C. Lucas, and A. Normand, to the effect that in the renewal of the Convention of Berne the words "architecture" and "architecte" should be inserted in the same category with the words "peinture," "sculpture," "peintre," and "sculpteur." M. David of Penanrnn then read a paper on "Propriété Artistique," which is to form a chapter of the book he is preparing on "l'Architecte au point de vue Juridique."

The meeting for the distribution of the rewards decreed by the Société Centrale was presided over by M. Yriarte, as representing the Minister of Fine Arts, supported by a large number of members, as well as the Presidents of the allied Societies. M. Yriarte, in his address on the occasion, recalled the fact that he had himself studied as an architect formerly, in the atelier of Constant Dufeux, and that these studies had been most useful to him in his subsequent career. M. Paul Seille read the report of the jury in the subjects of architecture, jurisprudence, and archaeology. Those who were "recompensed" in these subjects were for architecture M. Scellier, of Gisors, and M. Douguin, of Nantes; in jurisprudence, M. Charpentier of Paris; in archaeology, M. Leconte de Nougé, of Bucharest. M. Ronx called up the forty students who had obtained prizes in different schools, and the members of the "Personnel du Bâtiment," and the sitting was terminated at 3 p.m.

At seven in the evening the usual banquet took place at the Hotel Continental, at which 150 persons were present, including a considerable number of distinguished guests.

The present Congress has differed in some respects from preceding ones, and though there were some difficulties arising from defects of organisation, it was better attended and the questions considered were of more importance than on any previous occasion. Some special recognition should be given to the tact and courtesy with which M. Daumet presided over the meetings, and dealt with the conduct of the discussions.

[We defer until next week some notes regarding the visits and excursions made in connexion with the Congress.]

OXFORD MUNICIPAL BUILDINGS COMPETITION.

THE Oxford Town Council have selected the design by Mr. H. T. Hare (No. 5), which we pointed out in our article last week as the best.

LIVERPOOL ENGINEERING SOCIETY.—On the 25th ult., a number of gentlemen connected with the Liverpool Engineering Society assembled at the Alexandra Hotel, Dale-street, to present a silver tea and coffee service, with salver, to Mr. J. H. T. Turner, who has resigned his post as Secretary to the Society on his appointment as Assistant Secretary of the Institution of Civil Engineers, London. Mr. J. T. Woods, President of the Liverpool Engineering Society, presided. The salver bore the following inscription: "Presented to J. H. T. Turner, Esq., M. Inst. C.E., by members of the Liverpool Engineering Society, as a token of their appreciation of his services as hon. secretary. Liverpool, June, 1892." A bracelet for Mrs. Turner was also included.

THE ARCHITECTURAL ASSOCIATION'S VISIT TO CANTERBURY.

THE second summer visit was made on Saturday last, June 25, when a rather small number of members journeyed down under the conduct of Mr. G. A. Lansdown, the Secretary for the visit, and were met by Mr. J. R. Hall, who guided the party throughout the day.

On leaving the station the visitors proceeded by way of the well-known Dane John, with its curious mould, whose origin has puzzled so many of our archaeologists, and remains of the old city-walls to the cathedral. Here Mr. Hall pointed out the many features of interest, including the magnificent painted glass, whose date he described as ranging between 1220 and 1240 A.D. The various tombs, the pavement in front of the former site of Becket's shrine, and what was probably the most interesting collection seen during the day, the silver chalice and paten, pastoral staff, and sanctuary slippers of Hubert Walter, which, with other vestments and his emerald ring, were discovered in the tomb of that archbishop when it was opened some two years ago. As Hubert Walter, who was the immediate predecessor of the famous Stephen Langton, died in 1205, the interest of these very early specimens of Medieval craftsmanship is exceptional.

After a glance at the cloisters and Chapter-house, an adjournment was made for luncheon, and this being satisfactorily disposed of, the party proceeded to St. Martin's Church, which, whether or not it still retains, as is at least possible,—the remains of Roman building of the date 187 A.D., is certainly one of the oldest ecclesiastical structures existing in our country. The font, which is traditionally supposed to be the identical one in which Ethelbert, King of Kent, was baptised on Whit-Sunday, 597 A.D., has probably, if this be the case, been altered in Norman times, and, whatever may be the truth as to its date, is interesting both from its antiquity and from its excellence of design. The somewhat apocryphal tomb of Queen Bertha, the wife of Ethelbert, is to be seen in the chancel, and there can be little doubt that much of the existing edifice formed part of the church, consecrated at her instance by Lindard, Bishop of Soissons, and then dedicated to St. Martin, though it seems credible that the earlier church, which was restored by Queen Bertha, was erected to the honour of the Blessed Virgin.

Leaving St. Martin's Church, the members then inspected the ruins of the church or chapel of St. Patrick, which, it is said, was founded on the site of the pagan temple in which Ethelbert worshipped prior to his conversion. Very few remains of this now exist, but these are constructed with Roman material, sufficiently numerous in quantity to justify the supposition of great antiquity for much of the existing ruins. There is, however, sufficient internal evidence to show that considerable modifications, if not an entire rebuilding, took place in the thirteenth century.

From St. Patrick's the visitors were taken by Mr. Hall to the remains of the Abbey of St. Augustine, now fittingly used as a missionary training college.

This establishment was founded by Augustine as a Benedictine abbey, and dedicated to St. Peter and St. Paul. For many years it occupied a more prominent position in the church than the priory of Christ Church, which afterwards became the cathedral church of Canterbury, but when, after the time of Cuthbert and the canonisation of Thomas à Becket, the importance of Christ Church rapidly grew, the Abbey of St. Peter and St. Paul fell on evil times, and gradually declined till its utilisation as a brewery from which degradation it was only rescued by the instrumentality of the late Mr. Beresford Hope and other friends, who restored it to its present purposes.

The features specially noteworthy are the Great Hall, now used as the library of the college; the crypt under, now fitted up as the Coleridge museum, in which curiosities from various mission fields are exhibited; the Abbot's Guesten Hall, now the college-hall; the Guesten Chapel now the college chapel, with a beautiful altar in memory of Lady Hope, and a memorial chapel in the crypt beneath; the cloisters and quadrangle, and the entrance gateways.

The great church of the monastery, of Early Norman work, has remaining part only of the north arcade of the nave and part of the choir, which here seems to have extended a consider-

able distance westward of the crossing, a somewhat exceptional arrangement in Benedictine churches, though frequent in those of the Cistercian order. The fine tower of this church, known as St. Eshelbert's Tower, was reduced to ruins by the denudation of its worked stone for building purposes, and the ruins themselves were demolished in 1822. Drawings and prints showing its appearance at various dates are, however, in existence, some of which were seen by the visitors in the library of the college.

The effect of the long façade of the monastery with the three great towers to the entrance of the monastery, the cemetery, and the church respectively must have been very remarkable when perfect.

Leaving the college, the party were conducted again to the cathedral, where the crypt was inspected and the frescoes examined, as was also the Huguenot Church, which, however interesting historically, can hardly be a pleasant sight to anyone of artistic taste in its present condition.

Then the steps of the visitors were directed to the Norman remains to the north of the cathedral, including the so-called baptistry, and the well-known external stair forming part of the adjuncts of the King's School, founded by Henry VIII., a school which has produced some well-known men, such as Dr. Harvey, the discoverer of the circulation of the blood, Dr. Marsh, Bishop of Peterborough, and Lord Tenterden.

This completed the work of the day, and the party then returned to town.

The next visit will be on Saturday, July 9, to Eltham.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

CONTINUING our abstract of the evidence taken by the Commission, we may remind our readers that the witnesses for the Companies and the Conservancy boards of the Thames and the Lea have minimised the amount of the pollution that finds its way into those rivers above the intakes, have insisted on the efficiency of the inspection and of the protective measures, and have affirmed the sufficiency of the means adopted to purify effluents, and of the natural process of purification that goes on in the rivers themselves. This evidence of a negative or defensive character has been followed by evidence of a positive and accusative character from experts called on behalf of the London County Council. The river Thames was divided into two portions at Oxford; the whole watershed down to Oxford was assigned to Dr. Geo. Haynes Fosterke, Medical Officer of Health for the county of Worcester; the length of the river from Oxford to the intakes was allotted to Mr. Alfred Ashby, Medical Officer of Health for the Borough of Reading. These have made personal tours of inspection, noting all towns, villages, farms, works, mills, and sewage farms draining into the river and its tributary streams and ditches. The result has been the presentation of a complete topographical description of the watershed and valley, with an indication of most of (though not quite all) actual and possible sources of pollution. Last week we reserved the evidence of the Consulting Chemist to the Thames Conservancy minimising the consequences of the admitted pollution; and on the other side we have now the evidence of Dr. Edward Frankland, the Water Examiner, based on many analyses, not perhaps directly antagonistic, but adverse to Thames water as gradually deteriorated by chemically-treated effluents, as "sentimentally objectionable," and as doubtfully safe water for a community to drink.

Reserving for the present the scientific evidence on matters of opinion still the subject of experiment, we present some of the evidence relating to actual pollution.

Mr. Alfred Ashby, Medical Officer of Health of the Borough of Reading, and of the Wellesham Urban and Rural Sanitary Districts, in his statement, said:—I have made an examination of the Thames and its tributaries between the intakes of the London water Companies at Hampton and Oxford, a distance of nearly ninety miles, which I commenced in the early part of 1891, and have kept myself informed as to the present condition of the principal places where I observed pollution. The rivers and

streams I have examined are:—The Thames, from the intakes of the London water Companies at Hampton to Oxford, and the undermentioned tributaries:—On the north side or left bank: A small branch passing from East Bedford by Feltham and Hanworth; the Colne, with its branches; the Wye or Loadwater River; the Benson stream; the River Thame, with its branches; and the Northfield Brook. On the south side or right bank: The Ock, with its branches; the Sutton Courtenay Mill Brook, the Moor Ditch; the Wallingford Mill Brook, and the Kibble Ditch; the Pang; the Kennet, with its branches; the Loddon, with its branches; the Bray Cut; the Ousey and the Addlestone Bourne; and the Wey, with its branches. Several canals, which are intimately connected with some of the tributaries, join the Thames above the water intakes. On the north side the Grand Junction Canal joins the river below the intakes, but its highly-polluted water from between Tring, where the flow southwards commences, and Cowley Lock, below Uxbridge, finds its way through various channels into the Colne. There are some overflows from the canal into the river at Uxbridge, whilst much of the water from Cowley Lock empties into that river, and most of its water enters the Thames by several branches above the water intakes. On the south side of the Thames the Wilts and Berks Canal enters it at Abingdon, flowing towards it from Marston. Next the Kennet and Avon Canal joins at Reading, its summit being near Savernake Station, above Great Bedwin; and, lastly, the river Wey navigation flows into it at Weybridge, having previously been joined by the Basingstoke Canal. The Wey and Arun Junction Canal connects with the Wey at Broadford, about half way between Guildford and Godalming, but is now disused.—The main river and its tributaries traverse highly-cultivated lands, meadow land which is grazed during a portion of the year often adjoining the banks. There are numerous water-irrigation places for cattle, and many farmsteads drain into the streams, which present innumerable opportunities for pollution by cattle and washings from manured lands, whilst parts adjacent to some canals are often manured with horse and other foul refuse from London and elsewhere, and I have seen large deposits of such refuse fouling the streams. There are frequently dead decomposing animals, and occasionally dead human beings, in the streams, adding their quota to the deilement of the water; filthy bilge water from barges carrying offensive cargoes must of necessity be pumped into the rivers and canals along which they ply; there cannot fail to be considerable pollution from the floating population of canal-boats, house-boats, and other pleasure-boats; there is pollution from laundries, tanneries, fellmongers' yards, breweries, and paper-mills; whilst there are direct sewage and slop pollutions from towns and villages, and effluents from sewage works at various places, as detailed in the following statement. With reference to the so-called purification of sewage, it is quite erroneous to assume that because the sewage of any place is cut off from the rivers, as it is termed, and treated by some chemical process or land irrigation, that there is necessarily no pollution of the streams. For instance, although the sewage of Oxford, Uxbridge, and Watford is treated, I nevertheless found much pollution by excessively foul effluents from those places. When there is a cesspool-drained place on the banks of a river, there may be some indirect soakage of impurities into it; but I consider the safety of a river as a source of drinking-water supply is imperilled to a greater extent when such place is completely sewered, and the effluent from some works of sewage treatment is discharged into the stream, since so much depends upon the constant care and attention bestowed upon the working of the process; whilst it is impossible for continual supervision to be exercised over the works by any public or private body. There are sewage farms at Walton, Asford (the West Middlesex Schools), Eton, Slough, Windsor, Windsor Castle, Maidenhead, Henley, Reading, Monksford (County Lunatic Asylum), Abingdon, Wellingford, Littlemore, and Oxford. Independently of these more or less permanent pollutions, there are others of an occasional character which it appears to me cannot be avoided. For instance, in December last, three men were fined at Staines Petty Sessions for having emptied the contents of a cesspool into the Thames about a quarter of a mile above some of the London water intakes. The Chairman of the

Board is reported to have said that the practice of carrying out offences of this kind, which he doubted not were of frequent occurrence, was most injurious to London water-consumers. Having regard to all the facts I have ascertained, and bearing in mind the various chances of pollution which cannot be avoided, however carefully the sewage of inhabited places may be excluded, I cannot but regard the river Thames as an undesirable and unsafe source for the water supply of London. An accompanying table shows the area, houses, and populations of the districts which I have examined. In compiling it, I have included only those places which are situated upon or near to the streams which drain into or which appeared to be liable to drain into them. The total will, therefore, not coincide with any estimate including every place situated within the "drainage area" of the rivers. In the total area the increase of population has been about 67 per cent. during the thirty years 1861 to 1891, and during the forty years ending in 1901 it will probably have been about 54 per cent. In an accompanying map, I have marked the various places on or near the streams with circles, the size of them representing roughly whether the places are large or small. Places where I did not observe pollution, I have coloured blue; those where I found pollution of some sort or other, I have coloured black; and those where sewage is treated I have coloured brown. The pollutions I have been able to report represent a minimum quantity. The circumstances attending my investigation made it inevitable that some should have escaped my notice. Outside my own sanitary districts I had no right of entry on private premises.—The increase in the population during the thirty years 1861-91, has been about 67 per cent., and during the forty years ending 1901 it will probably have been about 96 per cent. Since there are so many favoured spots for residence in the valley of the Thames, and the river presents so many attractions, it is more than probable that the future increase of population will be at any rate maintained at its present rate. The increase has been chiefly in the towns and more populous places, the purely rural population having often remained nearly stationary, or having even decreased in some instances. The population of many of the places is largely swelled by visitors during the summer months, notably at Henley during the regatta. Although much has already been done, and it is probable that something more will be done, to divert direct sewage pollution from the Thames, there will nevertheless be a continual tendency to an augmentation of the pollution from sewage works, and from the ever-increasing number of people frequenting the river as a pleasure resort. There are 240 house-boats, and 646 steam-launches on the river. However stringent the regulations respecting these may be, and with whatever strictness they may be enforced, it cannot be doubted that there must be a considerable befouling of the water from these sources during a part of the year, and that at a time when it is likely to be at its lowest. There are now no water-closets on house-boats; they have earth-closets, but I cannot think that their contents are by any means always deposited on shore. In those I have examined, the sleeping apartments have a fixed washing-basin, with a waste-pipe discharging into the river, and a tub and scullery-sink which also discharges into the river. Mr. Ashby then proceeds to name every place on the banks of the Thames and its tributaries. In a few cases he saw no pollution. In many there was pollution of various degrees from drains, ditches, farmyards, and cesspools affected by the river level. With the object of indicating the general character of the evidence, as well as the volume of it, we select some typical examples of local description, while giving greater prominence to special instances of exceptional nature or magnitude.—

At Staines there is considerable direct sewage and slop pollution and drainage from two breweries and a Hadenham factory, discharged partly into the Thames, and partly into branches of the Colne which join that river. It is probable, however, that before long some steps may be taken to remedy this state of things, since the Local Government Board have made an order for the place to be sewered, but so far the Local Board do not appear to be inclined to comply with the order, and they are endeavouring to induce the owners of houses, draining into the streams, to drain into cesspools, which they will undertake to empty, so

* See last volume of the *Builder*, pp. 418, 435, 456, 469, 503.





1851



INK PHOTO SPRAGUE & CO. 4 & 5 EAST HANDING STREET, FETTER LANE, E.C.

and Wales.

—DRAWN BY MR. T. MACLAREN, A.R.I.B.A.

as to avoid a sewerage scheme. In the event of the town being sewered, it will entail the discharge of the effluent from a sewerage farm, on which the sewage of the whole place will be dealt with, probably being discharged into the river at no great distance above the London water intakes. At present there are numerous non-water-tight cesspools in the town. They and the shallow wells are affected by the river level. A cesspool near the river bank has not required emptying since it was made in 1877, and another on that adjoining premises has had to be emptied only three times during that period. The river and a ditch joining it pass near to the churchyard.

At Windsor there are two sewerage farms, one for the Borough and one for the Castle. They are situated at Old Windsor, above the lock on Ham Fields, which is an island in the Thames formed by the old river and the new cut. The land is not under-drained, but it appears as though the effluent must necessarily percolate into the river.

The sewage of Eton is pumped on to a farm at Eton Wick. I could find no under-drains, but the farm is skirted by a small stream joining the Thames. This stream is open to much cattle pollution on the Common, where I saw a large number of cattle, horses, and pigs grazing.

The Slough sewage is pumped on to another farm near by, at Dorney, which is surrounded on two sides by branches of a small stream. I could find no under-drains.

At Dorney Common I saw many head of cattle and horses grazing, and observed cattle pollution of the stream in many places. Near the village there are many filthy ditches and ponds. Some of this foul accumulation, due to drainage from farmyards and a privy, must be washed on into the stream during rainfall.

At Maidenhead, the lowest parts of the town where the Thames are drained into cesspools, which are affected by the river level, as are also the wells. The rest of the town is sewered by the high-level and a low-level sewer. The sewage is conveyed on to a farm on the bank of the backwater joining the Thames below Bray. Some of the sewage is pumped, but all of it is not; what is not pumped is put on to lower land, and on to a kind of artificial filter-bed close to the stream edge, and after passing through an apparently small thickness of soil it is discharged into the backwater. I saw six under-drains and a large main under-drain, from which much effluent, which looked turbid, was issuing. This part of the farm has been under water during the late floods. I understand that further works are to be undertaken there.

Cookham is not sewered; there are cesspools and surface-water drains. The cesspools and wells appear to be affected by floods. There is some slight slop pollution due to slops being thrown down the surface-water drains. On Whitebrook-common, and elsewhere, I saw very numerous animals grazing, and as there are watering-places in the brook, the water is liable to considerable cattle pollution.

Reading, an increasing borough, with 60,054 inhabitants at the census of 1891, is very thoroughly sewered. The sewage is pumped on to a farm by the Kennet-side. The land is under-drained, the effluent flowing by the Fendry Brook and other channels into the Kennet above its junction with the Thames. During the recent floods a great part of this land has been submerged. There is a duplicate system of sewers for surface and road water. These sewers discharge into the two rivers in various places, and it is impossible to prevent a certain amount of slop water being thrown into them.

The sewage from Moulsoford Lunatic Asylum, in the parish of Cholsey, which in 1881 contained 175 inmates, is treated on some undrained land near the river.

There has been serious pollution at Wallingford, but that will be prevented in future, as the place has now been sewered. The sewage is raised by Stone's ejectors on to some land, which, I believe, it is contemplated to leave undrained at present, but possibly it will have to be under-drained eventually.

Dorchester is situated on the River Thames, about half a mile above its junction with the Thames. Here there is much slop pollution from the surface gutters and road drains, the main outfall being into a ditch below the church leading into the Thames. A very foul deposit accumulates there, and blood from a butcher's shop is discharged into it from the

road sewer. The houses chiefly have privies or tub-closets, and there are also cesspools and shallow wells. I found a new cemetery was about to be laid out there. Holes have been dug in the ground, and water stood at about 5 ft. from the surface, although the sub-soil water-level was then very low. I was informed that this cemetery is to be drained into the Thames.

Abingdon, situated on the Berkshire side of the Thames, and partly on the Ock, is well sewered. The sewage is pumped on to an excellently-managed farm, which is under-drained. The effluent is discharged under water into the Thames. It appeared to be very good. I observed slight slop pollution of the river in one place.

Littlemore, on the Northfield Brook, a short distance from the Thames, contributes much pollution. I saw a ditch full of foul sludge with a drain, apparently from a large steam laundry, discharging into it. This ditch empties by means of a drain straight into the brook. Oxford sewage farm is situated here, and a little lower down the sewage from Littlemore Lunatic Asylum is treated on some land with under-drains discharging into the brook. The asylum contained 530 inmates at the census of 1881.

Cowley and Temple Cowley drain by surface water-sewers into ditches which flow into a small stream joining the Thames. I found large accumulations of the foulest sewage sludge deposited in those ditches.

Oxford is sewered. The whole state of this farm is had. The sewage is pumped on to land adjoining the Northfield Brook at Littlemore, at a distance of about three miles from the city. The farm is under-drained; I found the sewage effluent very bad. The water in a ditch passing through the farm was turbid, black, and highly offensive; large pools of sewage and sludge drained into a filthy ditch discharging into the brook, and sewage can run off the surface of the land into the stream. The water in the Northfield Brook was turbid and bad, and there was much deposit on its bed below the farm. There was slight slop pollution visible within the city. The population of the urban sanitary district of Oxford at the census of 1891 was 45,711. This is a very bad pollution.

[We have more of Mr. Ashby's statement in type, but we must break off here this week.]

A NEW WATER-HEATER.

THERE is no doubt about the utility of the Rapid Water-Heater, or "Geyser," as it is very commonly called, but notwithstanding the useful part it fulfils, there is a prejudice against them amongst the general public, due wholly to their having been accountable for some rather serious mishaps from time to time. This was when they were first introduced, and before being as well understood as now; but, of course, prejudices of this kind are slow to die. Of the accidents that occurred, there were two or three causes discovered which naturally led people to suppose that the articles were unusually productive of danger, but now the accidents have occurred, and the causes are known, it is hardly likely that opportunity will be given for similar mishaps to occur again. The chief sources of trouble were—firstly, the possibility of having the heating chamber, where the gas-burners are, full of gas before the match was applied, so that a more or less violent explosion occurred at ignition. This is remedied in various ways by making ignition only possible when the burners are drawn out from the chamber in question. Secondly, and what has proved most disastrous, is the free escape of all burnt gases, products of combustion which are of a dangerously poisonous character, into the room. Many bath-rooms are small, and could very quickly become dangerously full of these products, as the quantity from such a number of burners is large, and possibly the little room may have no fireplace to ventilate it. What fatalities have occurred were due to conditions such as these. Every rapid water-heater should have a flue, and the flue must be effective, otherwise the results may very possibly be more harmful than if no flue existed.

We have received a prospectus of the "Caldia" rapid water-heater, of a somewhat new design, made by Mr. G. Shrewsbury. It is almost entirely made of copper, and is of the kind that does not have the heat

imparted to the water direct, but has the water separated from the source of heat by the sheet copper of which it is composed (the direct and indirect methods are matter of much discussion). Another point in its favour, as against some of the other makes, is that it cannot, without special trouble, be emptied of water. It will be understood that if a "Geyser" can be quite emptied of water, and then the gas is ignited before turning the water on, that there may be some disagreeable phenomena and possible injury to the apparatus. As this heater discharges water from its top, it can be placed down on the floor if desired instead of over the end of the bath. It is quite adequate as regards the rapidity with which the water is heated, and the necessary element of safety in lighting is provided for, but Mr. Shrewsbury considers that no flue is required with his creation, and this is where we disagree. His heater can be made with a flue if desired, so purchasers have every opportunity of ensuring this element of safety if they desire, and we should strongly recommend everyone who thinks of using a rapid water-heater to have it connected or provided with an efficient chimney. With that caution, this heater may be safely recommended.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon last, Mr. John Hutton, the Vice-Chairman, presiding.

Resignation of the Chairman.—The Clerk of the Council, Mr. De la Hooke, announced that he had received a letter from Lord Rosebery, on June 22, resigning his office as Chairman, and enclosing £1, being the fine imposed in the circumstances under the standing orders. It would be for the Council now to declare the office vacant. The election of a new Chairman must be made within fourteen days of the notice being given of the vacancy.

The Vice-Chairman said he had received that morning the following letter from Lord Rosebery:—

"June 27.
My dear Hutton,—My resignation of the Chairmanship, which will be communicated to the Council tomorrow, is a somewhat tardy fulfilment of the agreement on which I assumed the chair. It was thought that it would be well to have in the chair a member of experience in that position to facilitate the start of the Council, and it was suggested that the opportunity might be taken of making a necessary change in our organisation. Both these operations have been absolutely smooth and uneventful, owing to the cordial cooperation of the Council itself. There was no difficulty, no friction, no opposition, nothing but zeal and goodwill. Under these circumstances I have almost to apologise for occupying the chair so long. But the fact is that the Council made the work always supremely attractive, though sometimes arduous, so easy, and so pleasant, that I was loth to leave. So I waited until the new General Purposes Committee had been finally appointed, and I never could feel that I outstayed my welcome. I cannot sufficiently thank my colleagues one and all for their kindness. I am sure that my successor will receive the same support, and as an ordinary member of the Council I hope to share its labours without distinction, but without discredit.
ROSEBERY."

The office of Chairman having been declared vacant, the thanks of the Council were voted to Lord Rosebery for his past services, on the motion of Mr. Martineau, seconded by Mr. Harben.

Proposed Electric Lighting of the Victoria Embankment.—The Highways Committee presented a report recommending:—

"That, subject to an estimate being submitted to the Council by the Finance Committee, as required by the statute, it be referred to the Highways Committee to carry out, at a cost not exceeding 10,000l., an electric installation with the necessary plant for the lighting of the carriage-way, footways, and parapet wall of the Victoria-embankment."

It is proposed to place lamps of 1,000 to 1,200 candle-power on standards erected in the centre of the roadway, about fifty yards apart. After some discussion, the report was agreed to.

Appointment of a District Surveyor.—The Building Act Committee reported that, in accordance with the conditions imposed by the resolution of the Council of May 31, 1892, Mr. G. McDonnell had formally resigned his appointment as District Surveyor for South-West Islington, and had made the usual declaration on acceptance of the District Surveyorship of South-West Islington, St. Luke, Old-street, and the Liberty of Glasshouse-yard.

Proposed New Street from Holborn to the Strand.—The Improvements Committee presented an important report recommending the

construction of a new street, not less than 100ft. wide, from Holborn to the Strand, but the consideration of the subject was deferred until Tuesday, July 19. We refer to the scheme in one of our "Notes" this week.

Tenders.—Mr. Beachcroft moved, and Mr. Roberts seconded, the following proposition:—"That Committees charged with the carrying out of works undertaken by the Council be at liberty to invite tenders from an approved list of persons willing to tender for such works under the conditions imposed by the Council; such list, however, in no case to contain the names of less than seven persons."

The discussion of the subject was adjourned, and shortly afterwards the Council rose.

Illustrations.

PORTRAIT OF M. CÉSAR DALY.

THE portrait which we give of M. César Daly, to whom the Royal Gold Medal of the Instituto of Architects was presented on Monday (when he made in reply probably the most remarkable extempore speech which has been heard in that room), is engraved by Mr. J. D. Cooper from a photograph which M. Daly was kind enough to have taken especially for this publication. Mr. Cooper has taken much trouble with the engraving, which is admitted by M. Daly's own family to be an admirable likeness.

It is unnecessary here to give a sketch of M. Daly's life and work, as this is already included in the address of Mr. Macvicar Anderson in presenting the medal, reported in full on another page.

SOUTHWELL CATHEDRAL.*

THE view of what is now Southwell Cathedral, but a few years ago was known as Southwell Minster, has been taken from a point in the north-east portion of the Cathedral enclosure from which Mr. Maclaren, the author of the drawing, has been able to group together in one view the central tower, the chapter-house, and the fine and solid Early English work of the east end, which gains additional effect by contrast with the elegant later work of the chapter-house. By the kindness of Mr. Ewan Christian, however, under whose architectural care the building has been for many years, we are enabled also to give a view of it from the north-west, which is not only a very accurate picture of the church as it was before the slight difference in its appearance produced by the recent restoration, but has the additional interest that it is believed to be an early drawing of Turner's, and if not his is probably by Girtin. The drawing has a note in manuscript on the back, evidently by the artist, which we have reproduced in fac-simile in the corner of the lithograph, as it has the interest of an autograph. The original drawing is slightly and delicately tinted in Indian ink.

For the following historical notes we are indebted to Mr. Ewan Christian, Camden, who had access to documents then existing at Southwell before the spoliation by Cromwell, quotes the Venerable Bede as his authority for attributing the foundation of the Minster to St. Paulinus, the first Archbishop. The "Simposion," a curious MS. now preserved at Southwell, and written in 1601 by one of the Prebendaries, evidently thoroughly acquainted with many sources of information then existing, says:—"If I fetch the antiquity of the Church no further than that learned, godly antiquary, Mr. Camden, hath done, although it come far short, yet it may easily thereby appear that there was many hundred years past a collegiate and parochial church at Southwell."

Dugdale quotes a grant made by King Eadwy to Archbishop Oseylt, 958. Thomas Stubbs has the following entry of a church anterior to the present one:—

"Kinsius Archiepiscopus ad ecclesiam sancti Johannis apud Beverlacum turrim excelsam lapideam adject et in ea duo procipta signa posuit similiter et in ceteris ecclesiis archiepiscopatus sui quo trans Humtram scilicet apud Southwellam et apud Ston, signa ejusdem magnitudinis contulit."

Stubbs further mentions the establishment of canons:—

"Terras multas de suo proprio emit et eas ecclesiam suam adject et de quibusdam prebendis

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page xx.

apud Southwell fecit et rectoria ubi canonici simul vescerentur unum Eborac aliterum Southwellense statuit."

The Domesday Survey gives the following as the possessions of the Church A.D. 1086:—

"In Sudwelle the Archbishop possesses ten carucates three clerics ("clericus") have 4½ carucates and two bovates in prebenda, they have also one other carucate and a half Binghamham in Crophill and Hellingly S. Mary of Southwell has 24 carucates of arable and seven carucates of pasture in Norwell the same church has 12 bovates of arable and six carucates pasture."

Bishop Thomas, who held the See of York from 1109 to 1114, addresses a letter to all his parishioners, which is preserved in the *Liber Albus*:—

"Thomas Dei Gratia ac omnibus parochianis suis de Nottingham scira salutem et benedictionem. Precamur vos sicut filios carissimos ut in remunerationem peccatorum vestrorum adjuvetis de beneficio elemosine vestras ad faciendam ecclesiam Sancte Marie de Sudwelle, &c., &c."

Walter Grey, Archbishop 1215 to 1255, grants an indulgence to his venerable brethren the Bishops, and to his beloved sons the Archdeacons. The letter is too long to quote, but one sentence is important:—

"Comigatur facultates ecclesie Swell ad inceptum dudum fabrice consummationem non sufficient et per benevolentiam suam opus laicus modis felicitate consumatur, &c., &c. Ad. dat. April. 10. Kal. Decembris Pontificatus nostri, anno decimo nono. A.D. 1233.

Robert de Lexington, Canon, founds a chantry not later than 1211. In 1294 John de Romaine, Archbishop of York, directs that as certain prebendal houses are falling into ruins on account of non-residence on the part of some strangers or foreigners ("alienigenarum"), they either be properly repaired within the year or heavy penalties imposed, which fines are to go towards the new chapter-house.

Next in order is a licence granted by the King Edward III. for the carriage of stone from the quarry of the fabric at Mansfield through the forest of Shyrewode. "Ex parte dilectorum nobis in Christo canonicorum et capitule ecclesie beatae Marie de Southwell nobis sit ostensum," &c.

In 1352 Torre quotes a letter of request to collect the alms and charitable contributions of the people within the city and diocese and but this rests on his authority, the letter not being now extant.

Donations to the fabric are mentioned in the years 1411, 1444, 1475, 1490, 1499, and 1534.

The following copy of a report of Mr. Ewan Christian on the state of the building and the work carried out in restoration will be of interest:—

"The work of repairing this church has been in progress during many years, under instructions from the Ecclesiastical Commissioners for England. Previous to 1851 the western towers were repaired and underpinned by Mr. Hailton, and the direction of the Rector, Archdeacon Wilkins, aided by the mason of the fabric, John Gregory.

During this time some of the fifteenth century windows were re-converted to Norman forms, following the example still remaining in the north aisle, and these were filled with stained glass by various donors.

In 1851 Mr. Christian was instructed to make a survey of the fabric and to advise generally as to its repair in the future.

The process of gradual repair then recommended was subsequently carried out, and the whole of the walls and masonry were carefully restored and put into sound condition; this work, under Mr. Christian's direction, was almost entirely done by John Gregory, mason, only occasionally assisted by others, aided by his labourer, John Cook, with an amount of zeal and devotion rarely exhibited by modern workmen, and was continued until the year 1875, when it was in almost every substantial respect, as regards masonry, very nearly completed.

During the progress of the repairs within the choir, it became necessary, in order to carry out the work of restoration, to remove the galleries with which its aisles had in the early part of the century been choked, leaving the space underneath them a foul rubbish hole; and those only who saw the church in its former condition can fully appreciate the enormous gain to the beauty of the interior which was thereby effected.

In 1875 a further report was made by Mr. Christian, under instructions from the Ecclesiastical Commissioners, with a view to the general completion of the building and its refitting as a parish church.

This report advised the renewal of the roofs of the whole of the fabric excepting the choir and central tower, restoring them to the original outline

which had been disregarded in the modern roofs erected after the great fire which occurred in the early part of last century; also the restoration of the spires on the western towers on the lines of the ancient ones removed in 1802, and the conical roof of the Chapter-house; also the re-flooring of the whole church, and the re-fitting of the interior of the choir with stalls for the clergy and choir, and the provision of chairs for the general congregation.

The works of re-roofing and spires being of heavier description than any before undertaken were executed under contract by Mr. Cliphsham of Norwell. The old roofs removed were of very poor construction, and covered with slate. The new ones are of massive English oak timbers, and all covered with cast lead.

When these were completed the re-flooring of the nave and transepts was substantially carried out on the old lines under the direction of the clerk of works by whom the general works were superintended.

Before anything was settled as to the re-fitting of the choir, the late Bishop of Lincoln (Dr. Wordsworth) consulted Mr. Street, who made a report to his Lordship confirming the advice given by Mr. Christian that the plaster screens put in the early part of this century between the choir and aisles should be removed, and suggesting that they should be replaced by new screens of oak on the model of those which formerly existed, and of which fragments were found still remaining *in situ* besides many loose pieces which had been stored in the roof of the Chapter-house. Mr. Street made other suggestions of value and interest as regards the use of the choir and church, but these did not come within the scope of Mr. Christian's instructions, which only related to the re-fitting of the building as a parish church.

The work of re-fitting, therefore, as carried out, comprises the renewal of the side screens and the fitting-up of new stalls in the place of the removed modern pews, also the re-flooring and the provision of chairs for the general congregation. This work has been leisurely done, in the expectation that when the destination of the building was to be changed from that of an ordinary parish church to that of the cathedral of an important diocese, contributions from the general public might be hoped for to aid in fitting it completely and worthily for so important a purpose, and in a manner befitting so beautiful a fabric. The flooring, therefore, and the stalls, so far only as the old ones extended, have been executed, leaving the pulpit, Bishop's throne, and any further screens and fittings that may be desired, to be carried out afterwards.

As regards this portion of the work, the stalls and the screens of the choir have been executed by Messrs. Cornish & Gaymer, of North Walsham, who have devoted considerable care and skill to the execution of the elaborate carving with which they are enriched.

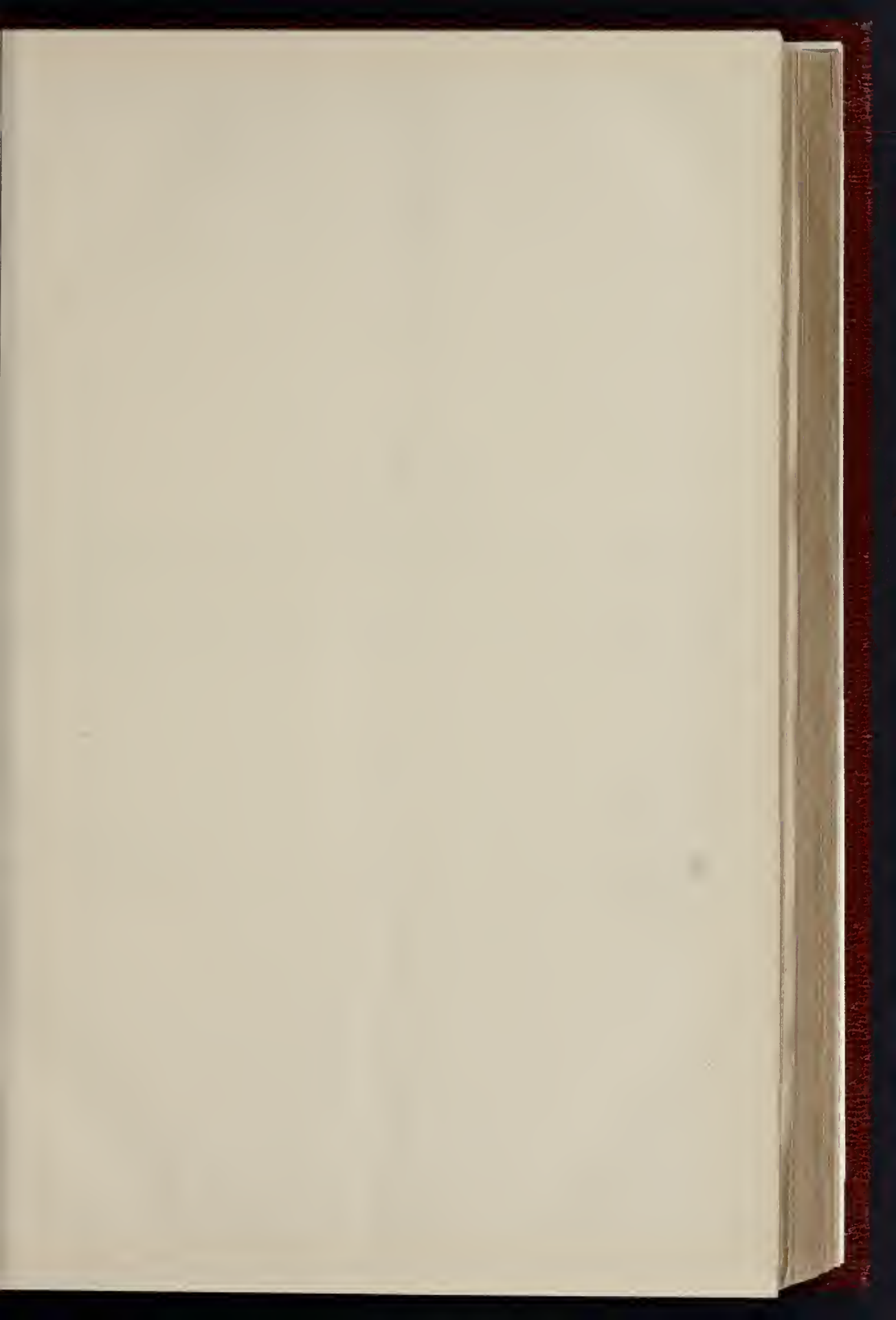
The flooring, also of stone and marble, has been executed by the same firm.

A new pulpit has not been provided, because it was felt that if hereafter a throne was erected for the Bishop, the two should be made to harmonise, and that the temporary omission would be of less importance than any imperfection in such important articles of furniture.

All the works hitherto executed have been done at the cost of the Ecclesiastical Commissioners, who were responsible for the general repair and maintenance of the fabric, but whose instructions did not extend to its treatment as the Cathedral of the new diocese.

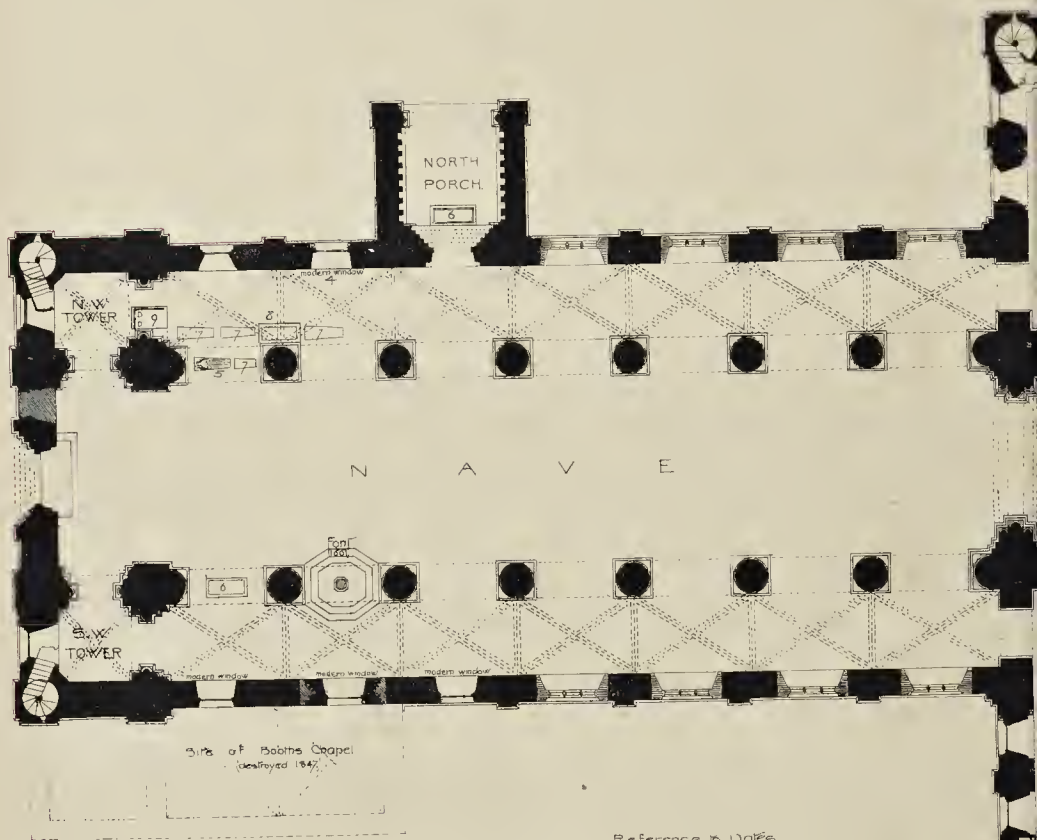
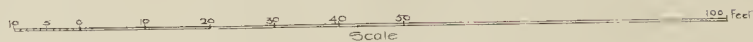
In regard to the general character of the building we may repeat here some remarks from a long article published in the *Builder* some years ago. The first view of the exterior from the west is the view of a grand, solid, bare Romanesque nave and Norman tower.

We apply the term Romanesque to the nave, since it presents, more than is often the case in English work, characteristics common to Romanesque architecture of a certain period all over Europe, and there is a very German look about the exterior, suggestive of the early churches of the Rhineland, in the straight lines of the western towers, the flatness of the buttresses, and the plain circular windows of the clerestory. One slight peculiarity in the details of the west tower is of interest. The northern tower has, at about two-thirds of its height, the form of decorative wall arcade so common in rather advanced Norman work, formed with round arches intersecting one another. The arcade in the same position on the other tower is a pointed arcade exactly the same design in other respects, the intersecting portion of the arches being omitted. This looks really like giving some countenance to the old and, as most of us now think, exploded idea that the pointed arch arose from the intersection of round arches. That it did so in this instance there can be no doubt, though this merely ornamental use of it does not invalidate the conclusions as to its structural origin when used on a large scale and as part of the construction of a building.



SOUTHWELL CATHEDRAL.

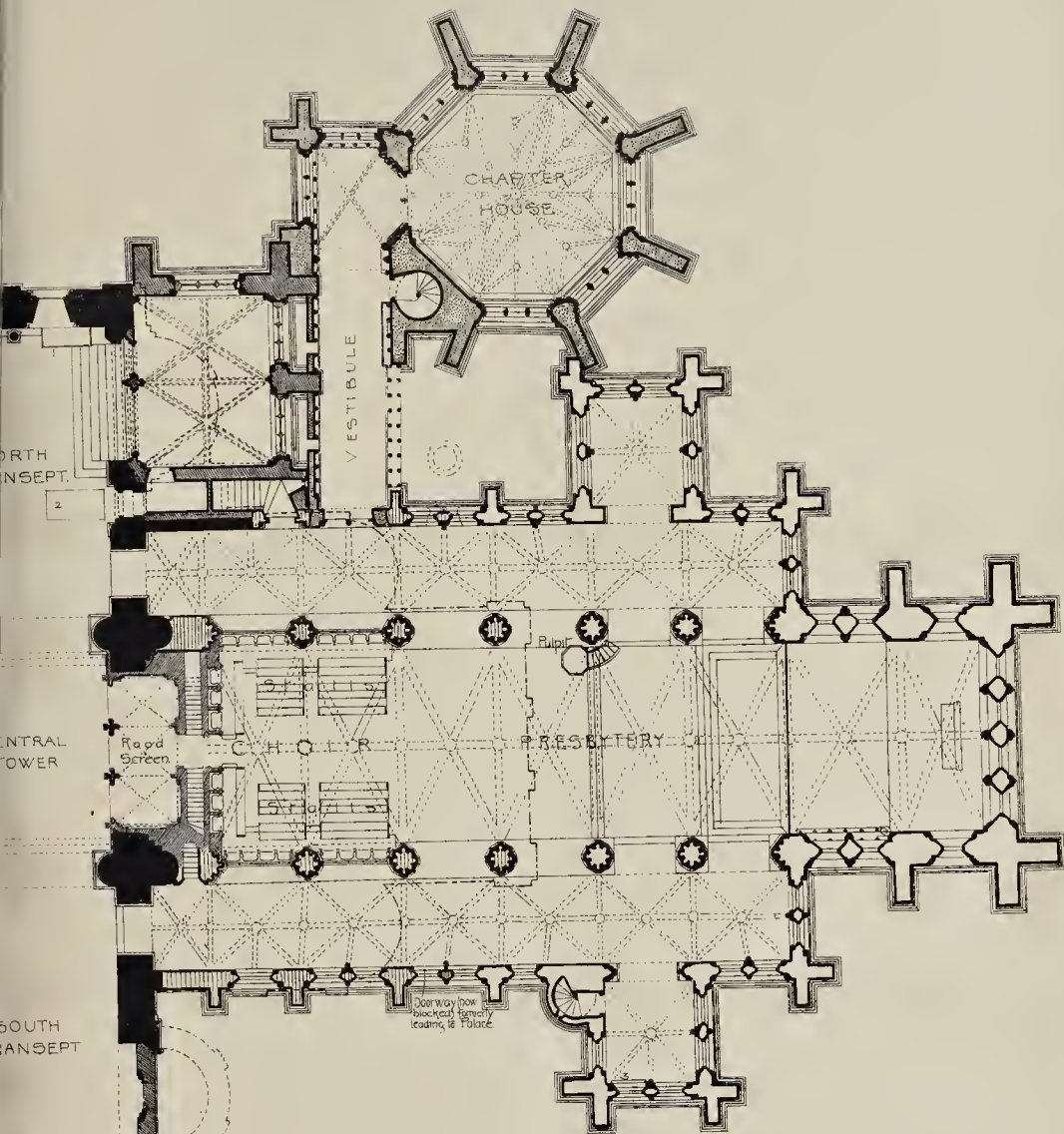
GROUND PLAN.



Reference to Dates.

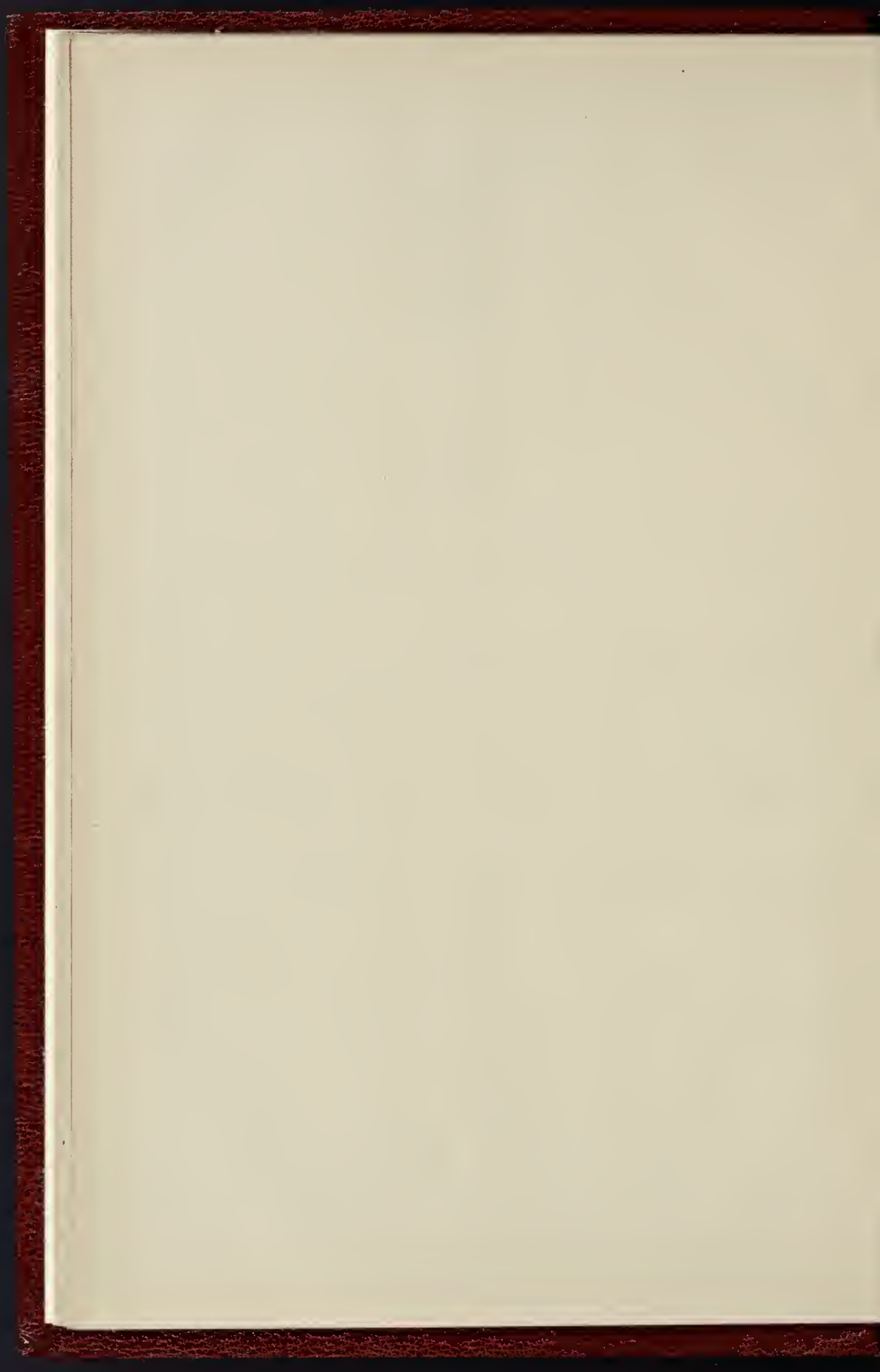
	1100-1150.	Archbishop Thomas II, etc.
	1215-1250.	Archbishop Walter Grey.
	1260-1280.	Canons Lexington & Vavasour.
	1294.	Archbishop John Romaine.
	1320-1337.	
	1425-1500.	Archbishop Kempe, etc.

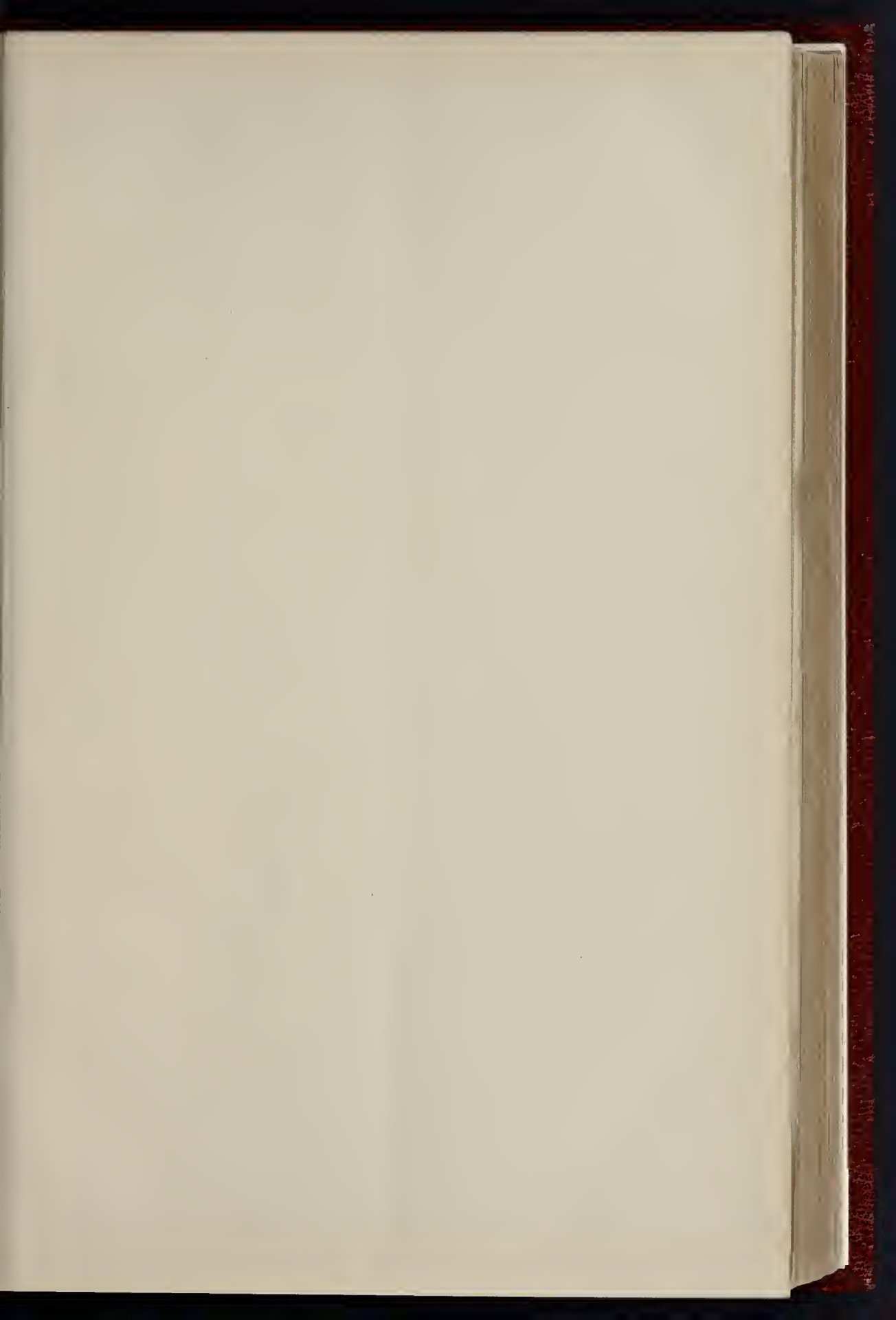
Note. The original form of the Norman Presbytery, etc. shown thus. - - - -



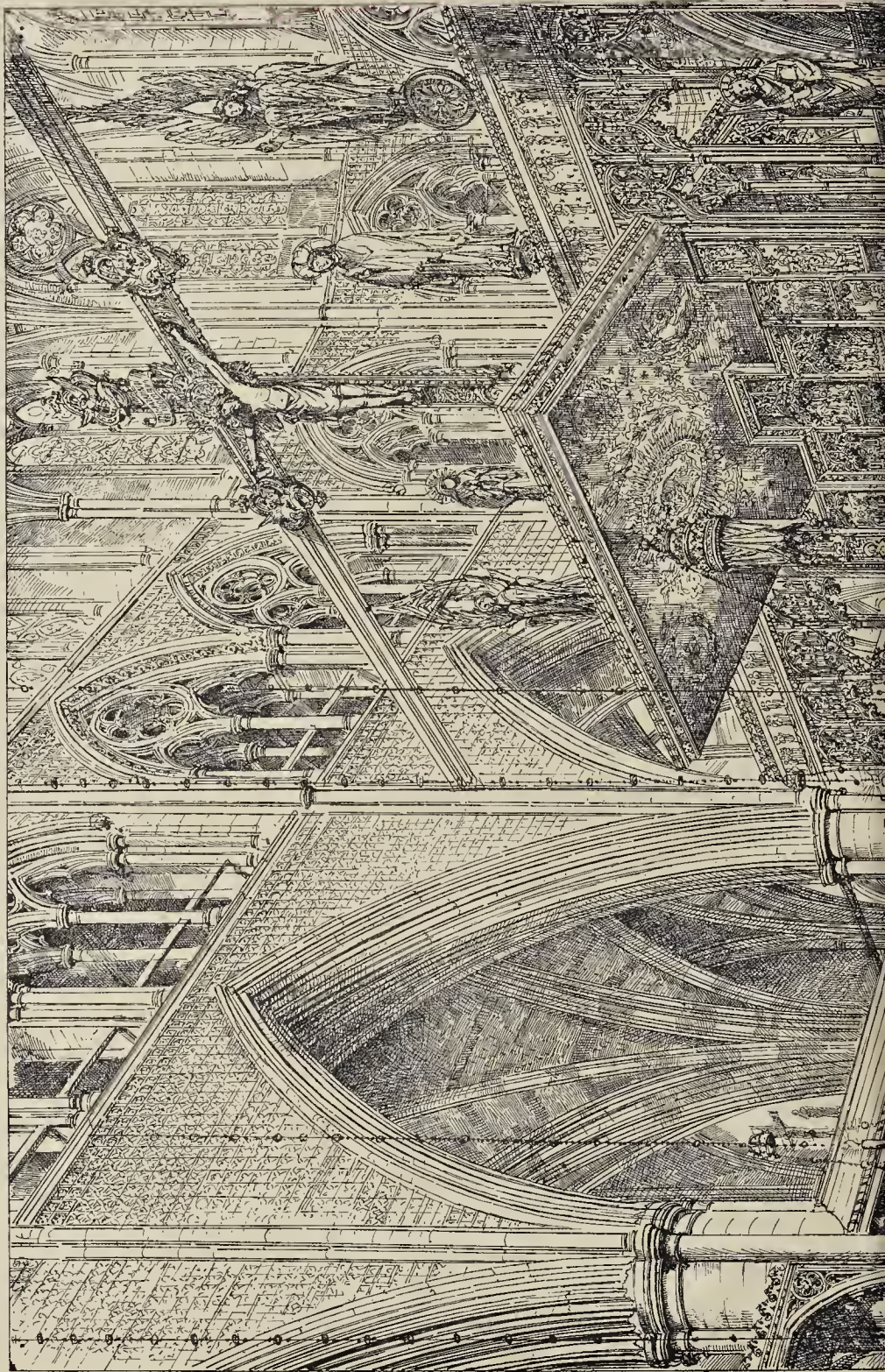
- Monuments, etc
- 1 Tomb of Archbishop Sandys 1588
 - 2 Matrix of Brass.
 - 3 Effigy
 - 4 Tomb in Recess
 - 5 Incised effigy
 - 66 Inscribed slabs.
 - 77 Slabs with crosses
 - 8 Matrix of Brass
 - 9 do do

From plans lent by Mr Ewan Christian.





THE BUILDER, JULY 2, 1892.



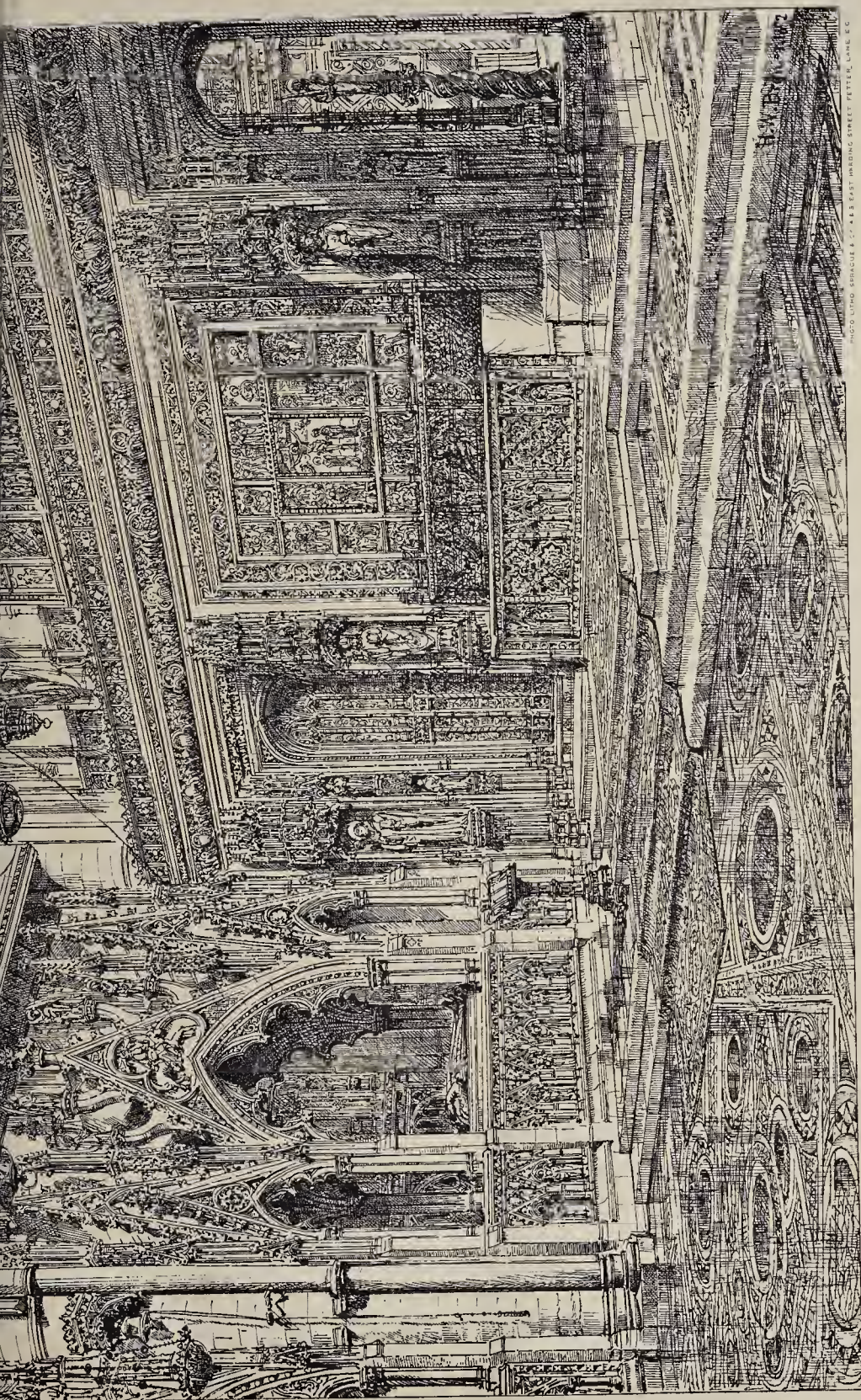
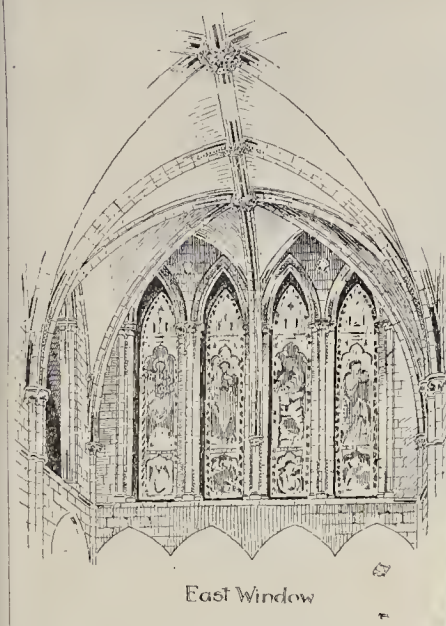
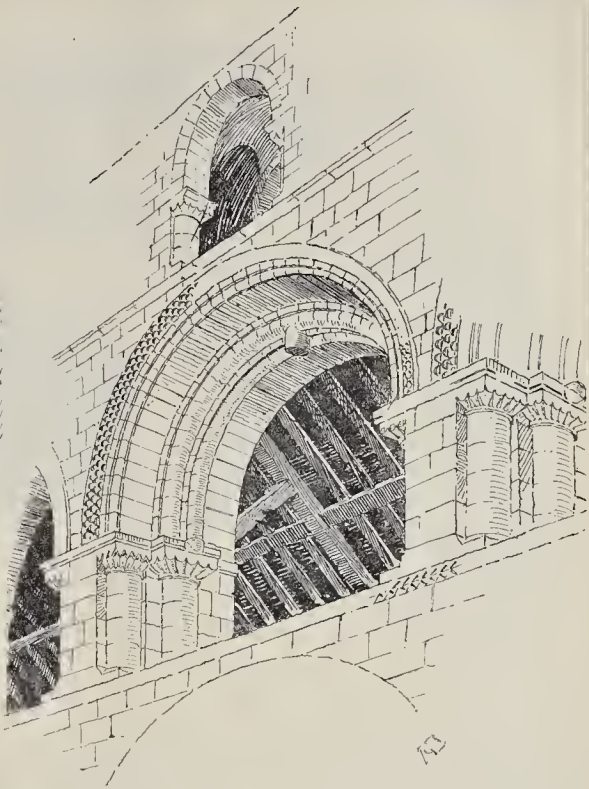


PHOTO-LITHO. SPRAGUE & CO. 423 EAST MADISON STREET, CHICAGO, ILL.

THE OLD HIGH ALTAR OF WESTMINSTER ABBEY,
RESTORED, FROM ANCIENT DRAWINGS AND DOCUMENTS, BY MR. H. W. BREWER.



East Window



Triforium of Nave

The stern character of the architecture is continued round the exterior of the nave and transepts; the fronts of the transepts have an almost barbaric appearance with the large rude cable-moulds to the windows, and the incised ornament of zig-zags and small circles filling up the heads of the low-pitched gables; and the change is the more remarkable from this rude architecture to the beautiful Early English work of the eastern transept chapels and the choir, and the later and richer work of the chapter-house. The chapter-house externally recalls a little, in the treatment of the buttresses especially, the York chapter-house, but on a smaller scale. Going round to the east portion of the choir, we are reminded still more of another Cathedral,—Lincoln. The architecture here is in the purest and most refined Early English style; very reticent of ornament, but with an almost Greek refinement and delicacy in the design of the buttresses and the general composition of the lines; and in general effect, and in the detail of the buttress-heads, the base-course, and other points, is so similar to the work of the nave and south transept of Lincoln that one cannot but think some of the same hands were employed on both. A peculiarity in the east end is the arrangement of an even number of lights in the window (four), with the pier in the centre, and the curious way in which the centre rib of the vault is brought down on to it.*

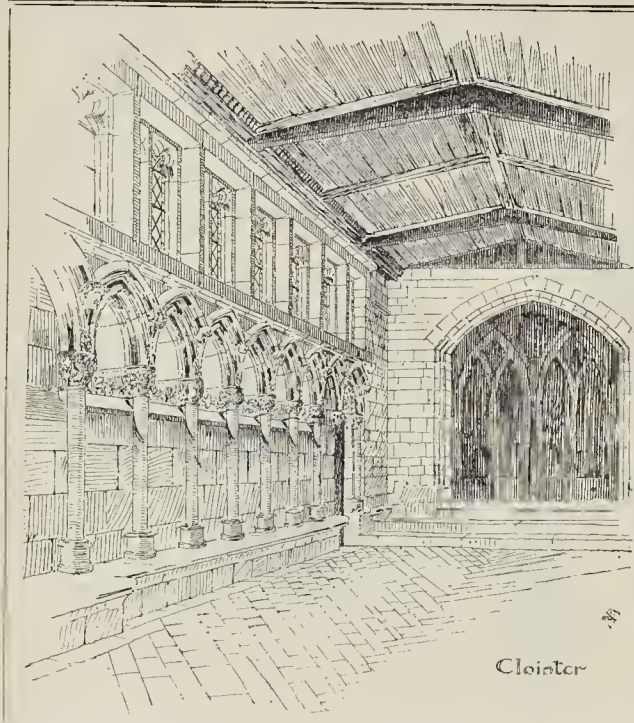


Centre Portion of Rood Screen
(From Choir)

Internally, the nave at Southwell is a grand specimen of Norman architecture, with the characteristic that, in place of the ordinary triforium gallery, there is what is in fact a double-storied aisle, the large triforium arcade opening, not on a narrow gallery in the thickness of the wall, but on a floor the complete width of the aisle, and resting on the lower aisle-vaulting. In the choir-screen we have one of the latest pieces of work in the church, Late Decorated, and very rich and beautiful in detail. The mimic vault which covers the entrance to the choir is peculiar in more ways than one; in the fact that it has vaulting ribs flying quite free of the vaulting surface (or what would be the vaulting surface if it were a genuine built vault), and still more in the fact that there is here found a decided and pronounced example of the German trick of interpenetration of mouldings. Another example of this occurs also, though less marked, in the aisle vaulting at the south-east angle of the choir. There is something unusual in other details of the work; as, for instance, in the wall diaper work on the inner side of the screen,

where we find a minute design dividing the wall differently treated,—a by no means usual refinement. The interior of the choir is a very fine specimen of Early English work, worthy of the

* This and the other sketches accompanying this article are all by Mr. T. MacLaren.

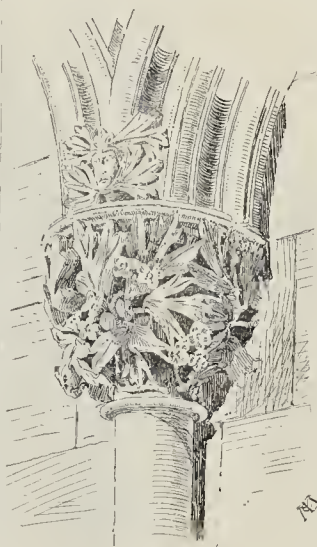


Cloister

exterior, and in remarkably good preservation; indeed, both the interior and exterior of the choir show in their present state how carefully the stone must have been selected, and how well the whole has been built. Much of the external detail is nearly as sharp and clean as if new. The chapter-house is approached from the choir by a passage, part of which has formed an open cloister along the side of a small open court left between the chapter-house and the north-east angle of the crossing. The arcade which separates it from the open court is carried by double shafts placed well apart, and with a cross lintel bearing from the inner to the outer shaft, from which the arch springs. The cross-lintels are carved on each face with beautifully delicate naturalistic foliage, in low relief, and mostly in excellent preservation. The beauty, however, of this little bit of architecture is at present much marred by the fact that the space between the shafts has been built up with a plain stone wall up to the level of the caps, and the space in the head of the arch filled up with glazing. This has no doubt been done for the sake of warmth during the time when the chapter-house was still in constant practical use by people who did not like draughts on their way to it; but by this proceeding the beautiful effect of the coupled columns is, of course, lost, and the whole thing spoiled. There can surely be no practical objection to removing this wall and opening out the little arcade again, and thus enabling us to realise the effect of a peculiarly elegant bit of architectural composition.

The chapter-house dates just about the zenith of the Early Decorated or Geometrical period, while the style still retained, with the richer decoration then coming into fashion, the chastened beauty of line and the constructive truthfulness and simplicity of the Early English style. Much of the carving in the chapter-house would convey in itself the notion of a later date, for a large proportion of it is as naturalistic as the carver could make it; but it is evident that there was an original genius at work here, who would not run in the accepted paths of conventionalism, and who, by his own individuality and love of nature, anticipated by a considerable period the style of naturalism which was afterwards to develop in English architectural carving, and not only anticipated it, but surpassed it beforehand.

Those who visit Southwell should not omit to go into the small open court before mentioned, adjoining the cloister leading to the chapter-house. From the north-east corner of the small court there is a most picturesque view of the parts of the building visible from thence, espe-



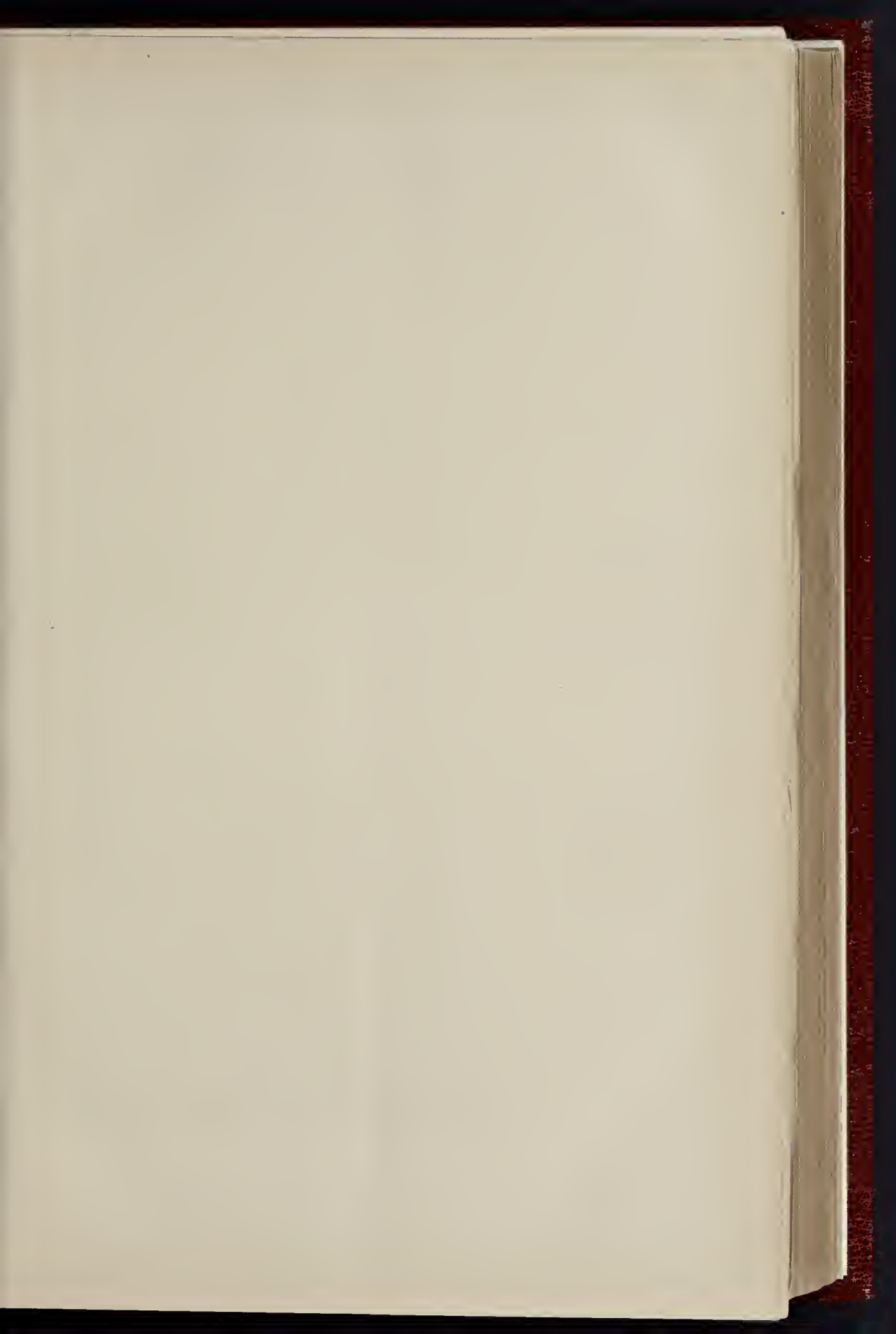
Cap in Chapter House

cially if seen, as we had the good luck to see it, on a day of bright sunshine and cloudless sky,—nothing visible but the picturesque and tinted walls of the choir and cloister, interspersed with beautiful bits of detail; and above, the grand mass of the central tower relieved against the blue sky

THE OLD HIGH ALTAR OF WESTMINSTER ABBEY.

THIS "Restoration of the old High Altar of Westminster Abbey" is chiefly founded upon the ancient drawing in the "Islip Roll," dated 1532, which represents the presbytery of the Abbey church as it appeared at the funeral of Abbot Islip, the last abbot but one before the Reformation. The Roll is in the possession of the Society of Antiquaries, and the drawings which it exhibits are executed in pen outline. By a careful comparison of these drawings with indications of existing remains, I have been enabled to work out this imaginary restoration. I must not, however, neglect to mention the fact that I am much indebted to Mr. St. John Hope and Mr. T. J. Micklethwaite for their valuable advice. Careful investigations made in company with these gentlemen discovered indications of the old arrangement, which in almost every particular corroborated the Islip Roll. I will now briefly describe the High Altar, pointing out those features of which distinct evidence exists, and those which are more or less conjectural.

The altar screen of the Abbey, sometimes called "the screen of St. Edward," was surmounted by a small gallery, within which stood two large statues of St. Peter and St. Paul; these were given to the church by Abbot Eastney about the year 1480. Probably Eastney constructed the great projecting canopy and upper portion of the altar screen which was open, and evidently built of wood. In the drawing this portion of the screen is represented as being surmounted by a beam. This beam, or fascia, was painted with a series of figures, as is distinctly shown in the Islip Roll, and the marks of the iron rods which acted as stiffeners, and kept it in position, are distinctly visible. The heads of the lights between the mullions which supported this structure unfortunately cannot be very distinctly seen in the Islip Roll, as that portion of the drawing is very much worn away. Upon carefully examining it with a powerful magnifying glass, the portion of an arched head of Tudor form can be traced, the tracery with which these heads are filled in is conjectural. The figures of St. Peter and St. Paul were very distinct in the roll. St. Peter is crowned with a pontifical mitre, and St. Paul holds a sword and a book. The great canopy or dais between these two figures is also shown in the roll, though its decorations are conjectural. This canopy projected a considerable way forward, so as to form a baldacchino over the high-altar and the officiating priest. From this canopy the pyx was suspended, within a canopy formed like a Papal tiara, beneath which hung down the pyx-cloths, which were of the usual form and had great knobs of gold and tassels at the angles. One of these pyx-cloths is still in existence at Hessel Church in Suffolk. The pyx containing the SS. Sacrament was suspended by a cord, so that it could be let down and placed on the altar, when required for communion. The pulley for this was fastened to the column at the north end of the altar-screen, where the hooks and fastenings may still be seen. In an engraving from the drawing in the Islip Roll which appeared in "Vestusta Monumenta," 1815, this arrangement of the suspended pyx has been incorrectly represented, and a standing tower is shown upon the gallery, surmounted by a Gothic canopy! It is simply impossible that this could have been correct, because the gallery evidently did not project far enough forward to carry a tower in such a position as to stand beneath the canopy; moreover, it is quite evident from the original drawing in the roll, that the arrangement was as I have shown it; in addition to which the universal practice in England during the Middle Ages was to suspend the pyx, and no exception has, I believe, been found to this rule. Of course, in Germany and Belgium the tower form of tabernacle of sacramentshaus was in use, also in Scotland and parts of France. Standing beneath the great projecting dais it will be noticed that there is a triptych or "table with wings." This is shown closed in Islip Roll, as it would naturally be at a funeral. The great square canopy, as will be seen from the drawing, projected backwards, considerably beyond the east side of the screen, and formed a kind of enclosed loft, in which the relics of the church were contained. Formerly they were placed in a shrine which stood between the monuments of St. Edward the Confessor and Henry III. This loft at the east of the altar-screen appears to have been



FAC-SIMILE OF INSCRIPTION ON BACK OF DRAWING.

'Southwell Minister'

Sax. n. - town of Harold II -
 W. side - William Rufus -
 Clapton house - built later date
 Acquired by Crompton
 & by lightning - 1711 -

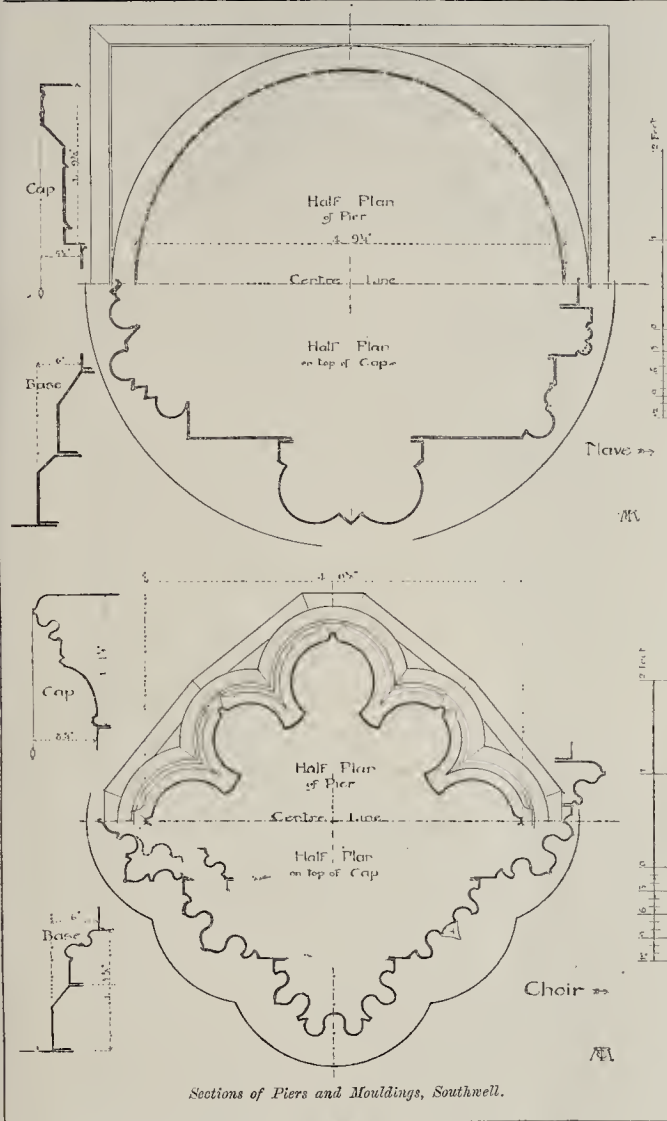


SKETCH OF SOUTHWELL M.
 FROM A DRAWING ATTRIBUTED TO TURNER



INK PHOTO SPRADUE & CO. • E. S. EAST HARGING STREET, FETTER LANE, F. C.

R FROM THE NORTH-WEST
HE POSSESSION OF MR. EWAN CHRISTIAN.



Sections of Piers and Mouldings, Southwell.

supported upon two columns, the marks of which can still be traced in the pavement, and the space between these columns is not paved like the rest of the chapel of St. Edward the Confessor with marble, but with tiles, showing that there was some raised platform or step here. This would have been immediately in front of the altar of St. Edward the Confessor. As part of the coronation ceremony seems to have taken place at that altar, I am inclined to think that this structure formed a kind of canopied pew, or throne, which was used during the coronation, perhaps for the ceremony of anointing the king. This hack portion, however, of the altar-screen is rather puzzling. Mr. Micklethwaite, who has given great attention to the study of this subject, is of opinion that the present stone screen was erected in the reign of Edward IV., and, as a strong proof of the correctness of his conjecture, it will be noticed that the vanlings, and other details of the canopies, are identical with those over the entrance of the chapel to St. Erasmus, which is adorned by the cognizances of King Edward IV. And now comes a difficult question: Was this structure which stood against the east side of the altar-screen of an earlier date than the screen itself, or not? If it was of an earlier date, how is it that the back part of the screen, which must have

been partly concealed by it, should have been treated so elaborately? But if it was erected after the screen, why should the space not have been paved like the rest of the chapel? However, this would be too long a question to argue. Upon the great beam over the loft was a rood, with attendant figures flanked by chernim, standing upon wheels. The arms of the Cross are shown in the Islip roll, supported upon a beam which went across the church, but, after a very careful examination, we have completely failed in finding any marks of the insertion of this beam into the walls.

I think the rood and its attendant figures were of an earlier date than the loft beneath, and even than the screen itself. I now come to the front of the altar-screen. The four great canopied niches are distinctly shown in the Islip Roll,—that to the north contained a statue of a monk, probably St. Benedict; the next was a bishop, possibly Melitus; the third was a king, possibly St. Edward; and the fourth was a pope, possibly St. Gregory the Great.

The space over the altar itself appears to have been occupied by a great square sunk panel, but in the roll it is all shown draped, except the centre portion, which was a painting of the Crucifixion. I cannot quite tell whether this representation of the Crucifixion may not

have been worked in embroidery, and attached to the hangings. We know from the inventory of the church furniture, &c., which was drawn up at the suppression of the Abbey, and has been republished by the Rev. McKensie Walcott, in the Journal of the Middlesex Archaeological Society, that the altar had an upper and a lower frontal, because an upper frontal, representing "Our Lady of Pity," is mentioned as having been given by Abbot Islipp. For the lower frontal I have shown the beautiful one which still exists, hung over the tomb of King Sebert. The inventory already referred to also mentions several pairs of altar candlesticks, and crucifixes with Mary and John, but as they are all spoken of as being in the sacristy of the church, probably they were only placed on the altar during Mass or other services; * in fact it is rather a singular thing that very few ancient drawings which I have come across, do show candlesticks on church altars. A singular kind of stool, or miniature table, is shown in the roll, attached to the south end of the altar. It seems too low for a credence table and too high for a stool; what it was, I am totally unable to conjecture, though I find indications of this feature in other drawings. The lectern for reading the Gospel is situated at the north-west corner of the foot-pace or altar platform, which, by the way, is very curious in its arrangement, as it has platforms at right angles to the foot-pace itself. The tombs of Crouchback and Aymer de Valence are represented as surmounted by wooden canopies, which no longer exist. There can be no doubt that the whole of the altar-screen, relic-loft, &c., was sumptuously and magnificently decorated, and must have presented a gorgeous spectacle. The utmost I have been able to do, however, is to present your readers with some idea of the general arrangement of this extremely elaborate structure, founded upon such evidences as I have been able to discover.

H. W. B.

THE GROWTH OF LONDON:
POPULATION AND WATER SUPPLY.

IN our report of the proceedings of the London County Council last week (p. 507), we chronicled the fact that certain resolutions were agreed to, on the recommendation of the Special Water Committee of that body, as to the possible requirements of London fifty years hence in the matter of water supply. These resolutions, which will in due course go before the Royal Commission on Metropolitan Water Supply, were as follow:—

1. That in making any estimates having reference to the future water supply of London, such estimates should be based on a period of fifty years from the present time.
2. That in dealing with the question of a source or sources of water which shall meet the requirements of London and its neighbourhood for fifty years, provision should be made for supplying a population of at least 12,500,000.
3. That in calculating the quantity of water required per head per day, the amount at present supplied by the companies should be increased by at least 10 per cent., and in no case should it be less than 55 gallons."

These resolutions were based on an elaborate "Memorandum" prepared by the Deputy-Chairman of the Council, Mr. W. H. Dickinson, in conference with the Committee, and in consultation with the Engineer of the Council, Mr. A. R. Binnie. Mr. Dickinson's "Memorandum" is as follows:—

"Shortly after the election of the first London County Council, a Special Water Committee was formed for the purpose of inquiring into the question of the water supply of the metropolis. At first no action could be taken in the matter, by reason of the fact that the Council had no powers to spend money for this purpose. These powers were acquired in 1890, and thereupon the necessary additions were made to the staff and to the offices, and the Engineer was directed to report upon the question of the present and future water supply. At the same time returns were directed to be obtained from scientific men as to the rainfall in the valleys of the Thames and Lea, as to the amount of water which could be obtained from wells, and as to the pollution existing in the above-named rivers. The Council found, however, that without the evidence of the water companies, and others having actual experience in the subject, it was im-

* The Rev. W. Eric Leslie tells me (upon the authority of a member of the Benedictine Order), that there was no rule relating to the arrangement of altar candlesticks observed by that order, but that each monastery had its own "custom," so that, although it may not have been the usual practice to remove the candlesticks from the altar, yet it may have been so at Westminster Abbey.—H. W. B.

the pipe giving way on the very smallest pro-
 cation. This effect is seen in a highly exag-
 gerated manner in the case of some descriptions
 of steel profiles; which sometimes break up
 with considerable violence, purely from the
 effect of internal strain due to unequal con-
 traction in cooling. The third defect to which
 reference has been made, unequal thickness, is
 due to the shifting of the core. This comes from
 careless handling, and should invariably lead to
 the rejection of the pipe when present to any
 marked extent.

Correspondence.

To the Editor of THE BUILDER.

COMPOSITION OF MORTAR.

SIR,—Mr. Hughes's instructive paper [see
Builder for June 18, p. 471] on old mortars:
 their chemical analyses and proportions of
 ingredients is a valuable contribution to
 building science. Personally, I am much
 obliged to him for pioneering, as for some time
 past I have studied the failure of mortar
 throughout London that has been compounded
 with sand taken from the gravel in the Thames
 Valley. I commenced my examination at
 Ealing, and have continued it through Ham-
 mersmith, Fulham, Kensington, Clapham, Fin-
 bury-park, Strand-green, Newington, Tottenham,
 Edmonton, and many other places, and, how-
 ever unpleasant the announcement may be,
 there is the fact that the mortar in every new
 building, whether public or private, including
 railways, and in which is sand taken from the
 Thames Valley, has failed on the surface in a
 few years after use, and but comparatively few
 joints remain sound externally, and this does
 not apply to speculative building only.

The District Surveyors are now endowed with
 the power of compelling builders "to use mortar
 composed of freshly-burnt lime and clean sharp
 sand or grit without earthy matter, in the pro-
 portions of one of lime to three of sand or grit."
 I call attention to failure now that we may
 not be censured hereafter for having neglected
 our duty.

The sand when dug looks bright, sharp, and
 clean, no one would condemn it from appear-
 ance, but that it has in it impalpable earthy
 matter which affects crystallisation, experience
 demonstrates. If this earthy matter were
 burnt as in Portland Cement the result would
 be different. That being so, the question is,
 How does this come about? It occurs to me to
 offer the following explanation:—A section of
 the brick-earth, sands, and gravel in the
 Thames Valley shows the following order of
 super-position: 1. Top soil. 2. Brick-earth.
 3. Sands and gravel, varied in places, as at
 Clapham, by intercalated beds of sandy
 clay in the gravels. As the brick
 earth is inundation mud, brought down,
 say geologists, by great rivers, derived in
 great part from the waste of the older deposits
 of London clay, Woolwich and Reading
 sands, Thanet sands, and chalk, it may be well
 to consider the chemical constituents of London
 clay. These are silicate of alumina with grains
 of sand, some carbonate of lime, and salts of
 iron. Brick-earth *in situ* appears dense, and
 the texture is fine; yet rainwater, charged as it is
 with carbonic acid, would for countless periods
 of time filtrate through it and carry into the
 sands and gravels below earthy matter, and it is
 this earthy matter, as already suggested, which
 prevents permanent setting or crystallisation—
 a mortar, in fact, which does leave an absorbent
 residue. Rainwater in a large city being highly
 charged with carbonic acid, flowing down the
 surfaces of walls, disintegrates the faces of the
 joints, and erosion of the joints to the depth of
 some three-fourths of an inch is a further result,
 assisted by solvents in the atmosphere.

The quality of the lime is, doubtless, impor-
 tant. In the specimens examined by Mr.
 Hughes the variation in quantity from 10.59 to
 34.45 is very great. Possibly the inferior quality
 of the mortar in Rochester Castle may be due to
 the use of lime made from the upper chalk,
 which is too pure a carbonate for mortar [by
 the analysis this has 20.60 of carbonate]. I
 know of cases where it has been used and
 remains soft to the present day near to the
 ground. My contention is, that the quality of
 mortar depends on the quality of sand, good
 mortar being an artificial sandstone, the lime
 acting as a matrix.

Having reviewed the Thames Valley sand,
 and the failures attending its use, the question

comes, What are the necessary precautions to
 avoid a recurrence? 1. Abandon its use. 2. If
 used, wash it, and use clean water for mixing.
 Sand with earthy matter used in concrete has
 brought about failure in dock construction. 3.
 Use one-half Thames Valley crushed sand, and
 one-half crushed bricks, slag, or ashes. The
 proportions: 1 of lime to 2 of sand and
 ground bricks; have each ground dry separately,
 that is to say, grind lime, bricks, slag, or ashes
 separately, and measure each before grinding,
 and carefully measured before grinding in mill.
 Thames river sand is the most reliable material,
 but it does not follow that a mortar which
 takes a long time to crystallise will not last.
 T. E. KNIGHTLEY.

THE SHONE SYSTEM OF TOWN
 DRAINAGE.

SIR,—In your issue of this date, with refer-
 ence to the papers read and discussed when the Municipal
 and County Engineers met at Peterborough on the
 11th inst., it is stated Mr. C. F. Gower said
 that "he should like no bear his testimony to the
 success of the Shone system as applied at Ipswich."
 This is not correct. In the first place, the Shone
 system is not at present applied at Ipswich: only
 suggested. In the second place, what I said was
 that "the transmission of power for pumping
 compressed air was an expensive system," and that
 "I thought it would be possible to bring the sewage
 of Stoke to one pumping station," which would
 avoid the necessity of the Shone system being
 introduced at all. C. F. GOWER.

Ipswich, June 25.
 * Mr. Gower spoke at some distance from the
 seat occupied by our reporter, who understood,
 from the remarks made both by Mr. Gower and by
 Mr. Buckham, reported in last week's *Builder* (p.
 501), that the Shone system had already been intro-
 duced at Stoke, a district under the control of the
 Ipswich Corporation.

The Students' Column.

CONCRETE.—I.
 INTRODUCTORY.

THE subject, "Concrete," has frequently
 been treated by engineers; to them,
 indeed, we are indebted for nearly
 all the knowledge we possess respecting
 the most valuable matrix for concrete,
 namely Portland cement, and to engineers
 we must look for information if we seek
 to know anything of the use of concrete in
 breakwaters, piers, and other works in the sea.
 But much of the information required by
 engineers is superfluous to the architect, and,
 on the other hand, architects continually make
 use of concrete in many ways different from
 those in which engineers usually employ it. It
 is the author's intention to treat the subject
 from an architect's point of view, in order that
 architects and architectural students may have
 as much information as may be necessary for
 their intelligent application of concrete to build-
 ings. The subject is a much wider one than
 is usually imagined. As a rule, architects can
 say all they wish to say about concrete in a
 very short paragraph of a specification. Even
 in books which profess to exhibit model speci-
 fications for all manner of work, we find con-
 crete dismissed with a line or two; the student
 has only to turn to Bartholomew's "Specifica-
 tions for Practical Architecture" to Rogers's
 revised edition of the same, and to others, for
 proof of this statement. The number of papers
 on Portland cement and on concrete which have
 been read before various societies of engineers
 and of architects, but especially of the former,
 shows that the subject is worthy of much more
 consideration than we are in the habit of
 bestowing upon it.

Definition.—Concrete is a solid mass formed
 from lime or cement, water, sand, and small
 irregular pieces of stone, brick, &c., by their
 "growing together" (as the word expresses it)
 when brought into contact with each other.
 The active agents in this solidifying process
 are the lime or cement and the water; the re-
 maining ingredients are inactive, being merely
 bound together by the foregoing. For this
 reason different names have been given to the
 two classes of ingredients. The active ingre-
 dients are called the *matrix*, as they may be
 said to form a "womb," in which the inactive,
 known as the *aggregate*, are imbedded. Very
 often, however, the mortar,—that is, the mix-
 ture of lime or cement, water, and sand,—is
 spoken of as the *matrix*, and the remaining
 ingredients only are called the aggregate; this

nomenclature has doubtless arisen from the fact
 that the strength of concrete, made with the same
 coarse ingredients, varies very nearly according
 to the strength of the mortar in which the coarser
 ingredients are imbedded, and not so much
 according to the strength of the lime or cement
 itself. For instance, it has been shown by Mr.
 Darnton Hutton that concrete composed of five
 parts of shingle imbedded in a mortar of one
 part of Portland cement and four parts of sand
 has only one-half the transverse strength of
 concrete composed of seven parts of shingle in
 a mortar of one part of the same cement and
 two parts of sand, and only one-third the
 strength of concrete consisting of nine parts
 of shingle imbedded in neat cement. In
 each case it will be seen the concrete consisted
 of one part of cement to nine parts of other
 ingredients. The mortar, therefore, and not
 the lime or cement alone, may with propriety
 be styled the *matrix*, and the remaining
 ingredients may be termed the *aggregate*.
 Neither of these names, we may say, is strictly
 accurate, but as they are the ones now usually
 adopted we shall make use of them.

Some writers limit the meaning of the word
 "concrete," and make a distinction between it
 and the French word "*béton*." In France it is
 customary to mix the lime or cement with the
 sand and water, and thus to form mortar; the
 broken stones or other materials are then added
 to the mortar, and thoroughly mixed with it.
 The whole is then known as *béton*. In England,
 however, the general practice is to mix the
 whole of the ingredients,—lime or cement,
 sand, broken stones, &c.,—dry, and, when the
 mixing is sufficiently advanced, to add water
 gradually, the ingredients being still further
 turned over during the operation. Some
 writers, therefore, limit the meaning of the
 word "concrete," by applying it only to con-
 crete prepared in the English way; and the
 word *béton* is taken to mean concrete prepared
 in the French way. There does not seem much
 reason, however, in limiting the meaning of the
 word "concrete," for concrete is concrete, no
 matter how it is prepared, just as stone is stone
 whether it be formed by the aggregation of
 countless myriads of microscopic organisms, or
 merely by the consolidation of sand-grains.
 We shall use the word "concrete" in its wider
 sense, especially as this is the sense in which it
 is now generally used.

Historical.—The Romans were the first
 great concrete-builders, and some of their
 concrete structures have not been surpassed in
 magnitude to this day. Vitruvius, who wrote
 in the first century after Christ, gives instruc-
 tions for its manufacture. In his book on
 architecture, he describes how to make con-
 crete pavements and floors, and concrete walls
 around wells. His specification for the con-
 crete in the last instance might be substituted,
 without very much detriment, for the clauses in
 some modern specifications. He says (ac-
 cording to Gwilt's translation),—"In the first
 place, the purest and roughest sand that can be
 had is to be procured; then material is to be
 prepared of broken flint, whereof no single
 piece is to weigh more than 1 lb.; the lime
 must be very strong, and in making it into
 mortar, five parts of sand are to be added to
 two of lime; the flint work is combined with
 the mortar, and of it the walls in the excava-
 tion are brought up from the bottom, and
 shaped* by wooden bars covered with iron." The
 Roman "libra," which we presume has been
 simply translated into "pound," was equal to
 nearly $\frac{3}{4}$ lb. avoirdupois of our weight, and
 therefore the pieces of flint were specified to be
 not larger than about 2 in. cubes; this size of
 aggregate would be used in similar walls to-
 day. Vitruvius also mentions the use of
 puzzolena, a volcanic earth or sand, which
 confers upon fat lime the property of setting
 under water.

Roman walls were almost invariably of con-
 crete or rubble, faced with brick, or stone, or
 marble. This facing was always thin. The
 bricks as a rule were triangular on plan, and
 measured about 11 in. along the face, and only
 6 in. from the face to the apex of the triangle
 which extended into the wall. The stones were
 sometimes only about 2 in. square on the face,
 and less than 6 in. on the bed, and were laid
 with the diagonals of the square horizontal and
 vertical, forming what was known as *opus
 reticulatum*. In any case, the strength of the

* Professor Aitchison, A.R.A., renders the word
 "rammed" instead of "shaped," and this would bring
 the specification of Vitruvius still nearer to modern
 practice.

wall depended on the concrete or rubble, rather than on the facing. According to Professor Aitchison, the concrete of the Romans was not mixed together before deposition, but a layer of mortar was laid, and the aggregate then deposited upon it, and this in turn would be followed by another layer of mortar, and so on. Bond-courses of large flat tiles were introduced every 4 ft. or 5 ft.

But not only were walls and floors constructed in this manner; arches, also, and domes were built, sometimes with a mere skin underneath of thin tiles laid flat, having radial tiles bonding into the concrete at intervals, and sometimes with skeleton framework or ribs of bricks and tiles, the whole being covered or filled with concrete of considerable thickness. The dome of the Pantheon, which was erected about the time of Christ, has an internal diameter of about 140 ft., and is built of concrete. An achievement like this would be thought great even to-day, when we have better materials and implements at command; but when we consider that the Romans had only fat lime and puzzolana to depend upon for the solidifying of their concrete, we think still more highly of their work. It is probable that the development of domed construction among the Romans was due in great measure to the material, concrete, of which many of their greatest works were built. Their partiality for concrete was due to three or four causes. In the first place, the great bulk of the work did not require trained artificers, of whom there was often a scarcity, but could be done by slaves or labourers, of whom there were many; in the second place, the work could be executed much more rapidly than with bricks or dressed stone, and this, then as now, was an important consideration; again, in many places suitable building stone could not be obtained; and, finally (for the Romans doubtless studied economy—they were such a practical people), concrete recommended itself for its economy.

Professor Middleton, in his recent work on "The Remains of Ancient Rome" (1892), gives his opinion that the brick facing of the Roman walls is not strong enough to support the concrete hearting while wet, and therefore that timber framing must have been used to support the walls during their construction. He thinks he has discovered proof of this in the Golden House of Nero, under the *Therma of Titus*, where upright grooves 6 in. wide and 4 in. deep, for the reception of the timber posts, are visible in the walls, the grooves, however, being afterwards filled up by the insertion of little rectangular bricks, so as to make a smooth, unbroken surface for the plastering." Into the other details of concrete construction given by Professor Middleton, we cannot enter here. Suffice it to say that the strength of the concrete seems not to have lessened at all, but rather to be greater to-day than ever.

In England examples of Roman concrete or rubble can be seen at Pevensey and Richmond, and other places. In Mediaeval buildings it was also used, not only in the hearts of walls, as in many of the castles, but also in the foundations, as in the Norman and Early English foundations of Ely Cathedral, in Salisbury Cathedral, and elsewhere.

In the fifteenth and sixteenth centuries we find Alberti and Palladio describing the method of constructing concrete walls, and from them we learn that the system in use in those days was the same as the one used to-day, with, of course, slight modifications; then as now, hoards were placed on each side of the intended wall, at the proper distance, and the space between was filled with mortar, pebbles, broken stone, &c.

In more recent days, it was used by Sir Robert Smirke in the foundations of Millbank Penitentiary in 1811. Smirke's specification says that the concrete shall "consist of fine gravel or ballast, freed from slime, sand, and sand, except that a small portion of the latter shall be intermixed with other material, in the proportion the architect shall direct, the whole to be well puddled and cast and mixed in lime-water." Smirke's specification is somewhat vague, but he knew how to deal with the gravel.

From this time forward, greater attention has been paid to the importance of concrete as a building material, until at the present day there is scarcely an architect who has not made use of it in some way or other. In 1835-6, Mr. George Godwin, the late Editor of the *Builder*, read a paper entitled "The Nature and Properties of Concrete, and its Application to

Construction up to the Present Period," before the Royal Institute of British Architects. In it he traces the use of concrete through various periods of architecture, and describes its use in his own day. At that time Portland cement had only been in use about a dozen years, and it is probable that it had very few of the advantages of the Portland cement made to-day. In fact, at no period of the world's history, has any cement been available which will bear comparison with modern Portland cement; this fact alone is sufficient to account for the increasing use of concrete, and for its application to a great variety of purposes, for which, without Portland cement it could not have been used. No notice of the history of modern concrete would be complete without the mention of such names as Mr. Tall, Mr. Drake, and Mr. Potter.

Uses.—Every architect uses it sooner or later in foundations. It is used in walls, floors, roofs, stairs, paving, drain-pipes, conduits, bridges, arches, lintels, building blocks, and in all sorts of so-called "artificial stones." It is used alone or in combination with wood, iron, steel, fire-clay lintels, &c. There are even concrete doors and concrete telegraph-poles, and mill-chimneys have been built of it. Engineers have used it in the sea in vast monolithic masses, deposited *in situ*, or in huge blocks weighing 200 or 300 tons each, or deposited in sacks, each weighing when filled as much as 100 tons; they have built of concrete, piers, breakwaters, docks, lighthouses, and have filled with it the caissons forming the foundations of the biggest bridges. Patents have recently been taken out for improvements in the methods of making and using concrete, and much money has been lost by unsuccessful inventors, but we advance by failures, and to-day concrete is used for a greater variety of purposes than ever before. It is our object to describe concrete, its ingredients, and some of its uses. We shall begin with limes and cements, as they are the most important constituents.

GENERAL BUILDING NEWS.

SHOREHAM NEW VIADUCT.—The London, Brighton, and South Coast Railway Company have been engaged for a long time past in replacing the cast-iron bridges on their line by others of modern construction. The old viaduct at Shoreham, which is over 1,000 ft. in length, and is composed of a large number of timber piers and cast-iron girders, is now being entirely rebuilt, and the new structure, which will be placed in exactly the position now occupied by the old one, is expected to take about fifteen months to complete. During its construction the line has always to be kept open for traffic, and but little time can be obtained for putting the new girders into place except during the night and on Sundays, when the number of trains passing over the bridge is somewhat reduced. The new structure will consist of a number of mild-steel plate-girders, 75 ft. long, carried by cast-iron cylinders, 5 ft. in diameter, sunk to a considerable depth, and afterwards filled with concrete.

PROPOSED LADY CHAPEL, ST. PETER'S CATHOLIC CHURCH, CARDIFF.—Mr. William Bevan, architect, Cardiff, has been selected as the architect for the proposed Lady chapel in St. Peter's Church, Roath, Cardiff. The chapel will be provided with aisles and will seat about eighty worshippers. The roof is to be open-timbered, and covered with slate.

ADDITIONS TO THE GENERAL INFIRMARY, LEEDS.—On the 28th ult. the additions to the Leeds General Infirmary were opened by the High Sheriff of Yorkshire (Sir Andrew Fairbairn). These additions, says the *Leeds Mercury*, may be described as four departments, namely—A ward pavilion of three stories and six wards; an out-patient department; a pathological department; and an isolation department. The ward pavilion contains three wards of sixteen beds each, and three wards of ten beds each, with six small wards. On each story there is a nurses' room, and there are also rooms for patients' clothing. Water-closets, baths, and lavatories are provided to each ward, and these rooms are lined throughout with glazed white bricks. There is a patients' lift, worked by water-power from the town mains, rising through every story, and provided with patent automatic safeguards at every opening. These, as well as the rooms for consulting, examination, operating, &c., grouped round it on the north, south, and east, and the dispensary on the west. The communication with the old Infirmary is by a prolongation of the north and south corridors on the first floor. The waiting-hall is 126 ft. long by 45 ft. wide, and it has aisles on

the north and south 12 ft. by 73 ft., separated by arcades supported on polished red Aberdeen granite pillars. The entrance is from the north side by a carriage porch. The eye and ear department occupies the north side of the waiting-hall, and the surgical department is at the east end. The medical department is on the south side, and on the same site as the rooms for the gynæcological department. The dispensary occupies the west end entirely. It is 45 ft. long by 16 ft. wide. Behind the dispensary are rooms for the dispenser and his assistants. Owing to the fall of the ground from north to south, two stories of rooms are obtained on the south side. The lowest is appropriated at present for store-rooms; the upper ones for nurses' rooms. The pathological department consists of a post-mortem room, with gallery for students; a mortuary, and a laboratory, with several subsidiary rooms. This is connected by a corridor with the main building. The isolation department is reached from the infirmary by a tunnel under the street, and consists of two wards for six beds each, and two for two beds each. A lift is provided from the tunnel level up to the ground floor, and there is a nurses' room, with pantry and store-room. It is proposed to provide additional accommodation for the nurses by raising the present nurses' house two stories and the present out-patient department in the old building will have to be remodelled for other purposes. Those who have been engaged in the work are as follows:—Mr. George Corson, architect; Mr. Brown, clerk of works; Messrs. Gould & Stevenson, for brick, stone, and wood, and fittings; Messrs. Hays & Worsley, for slaters; Mr. H. Beattie, plumber; Mr. Leonard Cooper, iron and steel work; Messrs. Westley, plaster and cement work; Mr. Bateman, painter; Mr. Macfarlane, concreter; Mr. Ebner, parquet floors; Messrs. Patterson, marble terrazzo floor; Messrs. Early Bros., opening gear to windows; J. H. Middleton, hydraulic engineer; Messrs. G. Smith & Sons, Birmingham, lamp, locks and iron fencing and gates; Messrs. Ashwell, Leicester, heating by steam; Messrs. Shorland, Manchester, ward stoves; and Messrs. Teale & Summers, ventilating grates.

MISSION CHURCH, CAUSEWAY LAKE, STAFFORDSHIRE.—The foundation-stone of the new mission church for St. James's parish was laid on the 11th ult. at Causeway Lake. The new church will consist of a nave 74 ft. long by 30 ft. wide, chancel 31 ft. 6 in. long, and same width as the nave; side aisles as passages only, and two shallow transepts, organ-chamber, 16 ft. by 12 ft. 6 in.; and vestries for the clergy and choir. A baptistry will be at the west end, and the church will be approached by porches at the north-west and south-west ends of the nave. The buildings will be built of red brick, stone only being used for the windows and other external dressings. The walls inside will be red brick, with a cement dado. The roof will be open-timbered, with braided ceiling, and covered outside with Broadley slate. The present portion of the church now being built does not include the chancel or vestries, or organ-chambers or heli-floche; but these will be added as soon as the funds will admit. The work is being carried out by Mr. Gough, of Wolverhampton, at a cost of 2,435*l.*, under the direction of Mr. T. H. Fleeming, architect, also of Wolverhampton.

CHILDREN'S HOSPITAL, COLD ASH, BERKSHIRE.—On the 8th ult. the new building for the Children's Hospital at Cold Ash was dedicated by the Rural Dean (the Rev. J. B. Antiske), and the wards were opened by Mrs. Mount. The hospital has been erected for twenty beds, and is capable of extension in future. It is a two-story building, connected with the old Home by a corridor, and having a hall and staircase, which gives access to the whole of the building. The lower ward is 20 ft. by 18 ft., and 11 ft. high. On the left of the entrance is the ward kitchen, and to the right are two nurses' rooms. A staircase of polished pine leads to the upper floor, which has similar accommodation to the ground floor. A third ward is proposed to be used for isolation or other purposes as required. It can be completely shut off from the general rooms. The architect was Mr. James H. Money, of Newbury; and the builders were Messrs. E. James & Sson, also of Newbury.

BOARD SCHOOLS, BATH.—New Board schools in Oak-street, Lower Bristol-road, Bath, were opened on the 18th ult. The building contains a girls' school, giving accommodation to 100, by a school-room for 70, and a class-room for 30, and an infants' school, giving the same accommodation. Both schools being designed with a view to further enlargement. The building is of Bath stone covered with slate in bands of two different colours. The cost of the whole building and laying-out of site was 2,444*l.*, the work being done by Messrs. Long & Sons. The ventilation of the building has been carried out by Messrs. Doyle & Sons. The architect is Mr. W. J. Wilcox, of Bath, whose design was selected in competition.

EXTENSION OF THE CALEDONIAN RAILWAY GOODS DEPARTMENT, GLASGOW.—An extension of the Caledonian Railway Company's Goods Department has just been made at Glasgow, where a new goods shed has been erected in the company's yard at the north end of Buchanan-street, at a total cost of 18,000*l.* The new shed, which is intended for the

English traffic, is 430 ft. long by 150 ft. broad at one end, and 80 ft. at the other. It contains three plantings starting from 340 ft. to 400 ft. long and 17½ ft. wide, and has accommodation for 70 waggon. Above the platforms there is a store with a floorage of 18,500 square ft. Attached to the platforms there are 25 hydraulic cranes, each with a lifting power of 30 cwt.; 3 hydraulic cranes of 3 tons lifting power; and 2 hydraulic boists of 25 cwt. lifting power. There is also a suite of offices. The building is constructed of white freestone, and costs 15,000l., the hydraulic cranes costing 3,000l. Messrs. Kinnear, Moodie, & Co. were the contractors, and Lord Armstrong's firm provided the hydraulic machinery. Messrs. George Graham and R. Dundas were the engineers.

PROPOSED CHURCH, COGAN, GLAMORGANSHIRE.—It is proposed to erect a new church at Cogan, near Cardiff, to accommodate 300, the cost being 2,000l. The project at present is to construct a nave 56 ft. 6 in. long, by 29 ft. wide, with chancel arch 21 ft. wide, and to a depth of 33 ft. back to the apse. Designs have been prepared by Messrs. Robinson & Salmond, architects, Cardiff, in the Early English style, and provision is made for throwing out side aisles at any future time. It will be constructed of stone, and the halfry will be fitted with an octavo of tube bells. A vestry and choir vestry are also provided in the present design.

FRANCISCAN CHURCH, ENNIS, CO. CLARE.—On the 11th ult. the dedication and consecration of the church of the Franciscans at Ennis commenced. According to the *Freeman's Journal*, the style of the church is in the main of the fourteenth century. The nave, including the apse, is 130 ft. in width. At either side are two smaller chapels derived from the main church by four columns of Aberdeen granite, from which spring, from foliated arches, three Gothic arches. The main entrance is worked in out limestone, with moulded jambs, the head being traciced with sixfoils and trefoils. Over the Virgin's Chapel is a small cloister for the friars and novices, and underneath this, and running around the altar, are the new companion rails. The organ-loft is built of Caen stone, supported on five arches of Aberdeen granite. Outside is the tower, which will be about 120 ft. high. The new altar is about 18 ft. high, and the principal material throughout is white Sicilian marble. The altar was built by Messrs. Pearce, of Dublin. The architect was Mr. Wm. Carrall, C.E., Ennis, and the contractor was Mr. D. Shank.

MISSION CHURCH, NEAR TENBY.—On the 18th ult., Lady Phillips, of Pleton Castle, laid the foundation-stone of a new mission-church at Kilgetty, near Tenby. The building will accommodate about 200 persons, and when completed will cost about 400l. The church is designed by Mr. A. P. S. Dawson, Saundersfoot, under whose supervision it will be erected, and the contractor is Mr. Frost, of that town.

SOUTHPORT CENTENARY EXHIBITION.—Messrs. Maxwell & Tuke, of Manchester, are the architects of the exhibition buildings at Southport. The gardens in front of the Cambridge Hall and adjacent buildings have been enclosed with an ornamental hoarding 7 ft. 6 in. high, the upper part being decorated with a balustrade. The area thus enclosed contains about 40,000 square ft., and the old fountains, walks, and flower-beds are retained. Certain buildings for offices, light refreshment-rooms, lavatories, &c., have been erected within the enclosure. The buildings utilised for the exhibition are the old Town Hall, Cambridge Hall, the Art Gallery, and the Art School. The difficulty of providing safe access to these four buildings without interfering with the public right of way between the Cambridge Hall and the gardens has been overcome by the erection of two 10-ft. flights of temporary stairs leading from the gardens to a temporary balcony extending the whole length of the fronts of the Town Hall and the Cambridge Hall, and as far as the corner of the Art Gallery. This balcony is 23 ft. wide in the centre, and has an entire length of 224 ft. The hand-stair for out-door performances is placed under and partly in front of the main staircase, and the under side of the staircase has been utilised for shops and stalls. The old Town Hall is used chiefly for the exhibition of objects of local interest, including models of old Southport. The Cambridge Hall is retained as a music-room, but contains in addition objects of interest, the chief of which is the copy of the Bayeux tapestry worked by the ladies of Leek. The tapestry, which illustrates the story of the Norman Conquest, is hung below the gallery front, and extends over three sides of the hall. The art galleries and art school are retained as picture-galleries. The dining-rooms are placed on the ground floor of the Cambridge Hall, and in addition to these there are stalls for light refreshments in the open grounds. Messrs. Duxfield, of Southport, are the contractors for the temporary buildings.

ADDITIONS, ST. MARGARET'S CHURCH, BURTON-ON-TRENT.—Certain alterations and additions have just been made to St. Margaret's Church, Burton-on-Trent, which was erected eleven years ago, and dedicated as a chapel-of-ease to St. Paul's Church, Burton-on-Trent. The chief alterations have been the enlargement of the chancel arch and introducing

curved corbels, a re-arrangement of the altar steps and enlargement of the altar table, the erection of a traciced oak screen to the front of the chancel steps, and an alteration of the pulpit. A baptistry has also been erected at the west end of the nave. This has been accomplished by removing a portion of the arcading, and building out a semi-octagon bay into the narthex. This is traciced on three sides, and pierced with narrow lights filled with grisaille glass. The tracery is continued on the inside over the whole of the five panels of the recess. The floor has been laid with polished marble in black and white, and the font is supported on a polished black marble step and foot space. The font has been executed by Messrs. Farmer & Brindley from the architect's designs, and is of alabaster. The works, with the exception of the font and pulpit, have been carried out by Mr. Geo. Hodges, of Burton-on-Trent. The pulpit alterations have been executed by Mr. W. Gould, of Tuthury; and Mr. Roddis, of Birmingham, is responsible for all the carving. The remaining windows of the narthex have been filled with grisaille glass, furnished by Messrs. Burlison & Grylls, of London. The works have been executed in accordance with the plans and drawings prepared by Mr. Roginall Churchill, of Burton-on-Trent, the architect of the church, and the cost has been borne by Lord Burton. The building is shortly to be consecrated.

ST. SAVIOUR'S CHURCH, FOLKESTONE.—The Bishop of Dover attended Folkestone on Monday afternoon, and conducted the opening service at the new church erected by the residents in the parish of St. Saviour's. At present only the chancel, first bay of the nave, organ chamber, and vestry, have been erected. The plans show that it is proposed to add a tower, with a peal of bells, and a southern transept as a memorial to the late Rev. Claude Hankey, a former Vicar of the parish. The entire work will cost 10,000l., the cost of the present portion of the building having been about 3,000l. The style of the building is Early Gothic, and the architects are Messrs. Somers Clarke & Micklethwait, of London. The builder is Mr. William Dunk, of Folkestone.

NEW HEAD POST-OFFICE, SOUTHAMPTON.—We bear that the Commissioners of Her Majesty's works have accepted the tender of Messrs. Crook & Sou, of Southampton, for the erection of this building, and that the work will be commenced very shortly.

SANITARY AND ENGINEERING NEWS.

NEW WATERWORKS, WAREFIELD.—The first sod of the new Withens Reservoir, on the Rishworth Moors, in connexion with the Wakefield new waterworks, was out on the 23rd ult. by Councillor J. S. Booth, the Chairman of the Waterworks Committee of the Corporation. The reservoir will have a capacity for 240,000,000 gallons. The works have been let to Mr. T. Oliver, of Horsham, Kent, and the cost is estimated at 120,000l. Mr. H. Hofo, of London, is the engineer to the scheme.

PONTEFRACT WATER SUPPLY.—The Roall water scheme, to supply Pontefract and district with a better supply of pure water, was completed on the 20th ult. The engineer was Mr. G. Hodson, of Loughborough; and the contractors were Messrs. Vickers & Son, of Nottingham. The mains from the pumping station at Roall are laid for a distance of nine miles to the storage reservoir on the Park-hill at Pontefract. The total cost of the work will be about 28,000l.

EVESHAM SEWAGE WORKS.—We have received from the International Water and Sewage Purification Company the following statement of the work intended to be carried out at Evesham:—"A scheme has been submitted to the Council by their surveyor, Mr. R. Mawson, C.E., for putting the works into first-class condition, and the scheme has been approved. It is intended to adopt the complete process of the International Company, which includes polarite filter-beds in place of the land, careful inquiries and experiments having led to this decision, supported by the Council's experience of the use of ferrozone. The present dry weather flow is 120,000 gallons of sewage per day, the existing tanks having a capacity of 40,000 gallons only. It is intended to provide three tanks of 50,000 gallons each, on the intermittent system, and four polarite filters, of 50 square yards area each. The sludge will be raised from the sludgewell and pressed into cakes by compressed air. The compressed air will be provided by a 4 b.p. gas-engine, which will also pump the small proportion of sewage which is delivered by the low level outfall sewer. The works, though small, will be constructed with all the best arrangements for working, in order to reduce the expense of labour to a minimum. The Evesham sludge manure from the ferrozone-treated sewage has been analysed by Mr. Smetham, of Liverpool, who reports:—

In sample dried at 212 deg. F.	Percentage of
Phosphoric acid	2.41
Equal to tribasic	5.26
Poss. of lime	2.58
Equal to ammonia	3.11

One of the leading market gardeners of Evesham considers that when dried and ground this sludge is worth 50s. per ton, and as Evesham is surrounded by hundreds of acres of market-gardens, the manure

will find a ready demand." It is to be hoped this latter expectation will be realised; but estimates of this kind as to the commercial value of the sludge have often proved disappointing in the ultimate results.

FOREIGN AND COLONIAL.

FRANCE.—An artistic exhibition, to be called the "Salon d'Été," is to be opened on July 5 at the Palais des Arts Libéraux, and closed on August 31. The Minister of Public Works has just asked the Government for 2,200,000 francs for the installation of a Cour des Comptes in the new buildings of the Marsan Pavillon at the Tuileries.—The jury of the Town-hall of Montreuil-sous-Bois has just nominated M.M. Bourgonnier, Gorguet, and Henri Martin to take part in the second degree of this competition, which is to be definitely settled in November next.—A fine antique mosaic has just been placed in the Louvre Museum. It was found at Saint Romain en Gal (Rhône). The mosaic, which is in four compartments, ornamented with figures representing the seasons, is more than eight metres long and four and a-half wide.—The International Archaeological Congress has just assembled at Orleans. Amongst the foreign societies represented is the Royal Archaeological Institute of Great Britain.—It is announced that the inauguration of the statue of Boethius at Sarlat (Dordogne) will be held the first week in July.—The town of Calve (Corsica), which disputes with Geneva the honour of having been the birthplace of Christopher Columbus, is preparing to celebrate the fourth centenary of the discovery of America, by erecting a monument to the memory of the great navigator.—A committee has just been formed, under the presidency of M. Carolus Duran, to erect a statue to the Abbé Prevoist. This monument will be set up at Hédin (Pas de Calais), the native town of the author of "Manon Lescaut."—Very shortly there will be an inauguration at Anzin (Nord) of a monument, which has been raised by subscription, to the working miner, Fontaine, who was the inventor of a system of stopping the cage as it descends into the mine, in case of the ropes giving way.—The closing of the Champs de Mars Salon, which was originally fixed for June 30, is now put off till July 10.—It is announced that Madame Léon Bertaux, the founder and President of the Union of Women Painters and Sculptors, intends to offer herself as a candidate for the chair in the Académie des Beaux-Arts, which has been left vacant by the death of M. Bonassiéux.—M.M. Hannotin and Mauer have just obtained the travelling studentships awarded by the Superior Council of the Fine Arts to young architects who have exhibited in the Champs Elysées Salon.—The deauville is announced of M. Antoine Georges Louvier, architect at Lyons (Rhône), Corresponding Member of the Institute, and late Chief Architect of the Department of the Rhône. He died at the age of seventy-five.

MISCELLANEOUS.

ROGERS' VENTILATING SASH-PASTEREN.—This is a fastener invented and patented by Mr. M. Rogers, intended to enable a window to be fixed open at top and bottom sufficiently for ventilation, so that the sashes cannot be opened further from the outside. It consists of a metal rack fixed vertically on the inside of the side rail of the upper sash, and a spring bolt fixed on the top rail of the lower sash, the end of the bolt working into the rack. The upper sash can be lowered a few inches, and the lower one raised to the same extent, and kept fixed by the bolt in the rack when desired. The bolt can be held back by a catch while the sashes are being adjusted. It forms an effective and convenient method of fixing the sashes open for ventilation.

THE REPAIR OF LINLITHGOW PALACE.—The *Glasgow Herald* says that, by direction of the representatives of Her Majesty's Board of Works in Scotland, operations have now been commenced for the repair of Linlithgow Palace. Representation having been made to the Government, principally on the part of the Edinburgh Architectural Association, the Government added a sum of 5000l. to the estimates, for the purpose of preserving those parts of the palace most in need of repair. Of that sum 2500l. will be expended this year, and 2500l. next year.

SANITARY ENGINEERING AT SCARBOROUGH.—Owing to great pressure of other matter on our columns, we are obliged to hold over, until next week our report of the meeting of the Incorporated Association of Municipal and County Engineers at Scarborough.

THE ENGLISH IRON TRADE.—There is little change to chronicle in the English iron market. Pig-iron is quiet; but in most cases rates are maintained, and in the Cleveland district quotations are 1s. 6d. higher on the week. In the hematite pig-iron branch, however, West-Coast makers are quoting 1s. less. Manufactured iron is still restricted to hand-to-mouth requirements; but tinplates are in fair sale, and rates continue strong. The steel trade exhibits little alteration. Engineers and shipbuilders are moderately engaged. The coal trade is a little quieter.—Iron.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Prize.	Designs to be delivered.
*Free Library, Art Gallery, and Museum.	Oldham Corp.	200, and 100.	July 18
*Construction of Sand-gard and Widening Marine Parade.	Borough of Blackpool	200	July 23
*Infectious Diseases Hospital.	Kelso Corp.	100 and 50.	July 30

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Private Street Improvements.	Birkenhead Local Bd.	G. B. Carlton	July 4
*Supply of Road Material.	Lewisham R. of W.	Open	July 5
*Pipe Sewers, &c.	East-Ham Local Bd.	Open	do.
*Paving several Streets.	Plymouth Corp.	G. D. Bellamy	do.
*Boundary Walls and Fences.	Devon County Council	S. H. Hudson	do.
*Sewerage Works.	Newtown-U.R.S.A.	R. Sagar	do.
*Painting Workhouse.	Newton-U.R.S.A.	W. S. Cross	do.
*Hall's House and Committee Room.	Manchester Corp.	Official	July 8
*Infants' School, near Postgrange.	Lanawood School Bd.	A. O. Evans	do.
*School Building, Navigation.	do.	do.	do.
*Tolled York Farming.	Mile End Old Town	J. M. Knight	do.
*Asphalte and Wood Paving Works.	Ves. of St. Margaret & St. John, Westmin.	G. W. R. Wheeler	do.
Business Premises, near Newcastle-on-Tyne.	Ashington Co-op. Soc.	Official	July 8
Grand Stand, &c. Warington.	Devonshire Agr. Society	Official	do.
Ecological Buildings, Rothley, Leics., N.B.	do.	Official	do.
Cemetery Chapel.	Barry and Goddard	A. & W. Reid	July 9
Workmen's Institute, Dinas Betate, Penryn, Cornwall.	Barry and Goddard	Bruton & Williams	do.
Waterworks, Upper Cambric, Central Loc. Bd.	do.	A. Lawrence	do.
*Supply of Building Materials to Civilian Prisoners in England.	Directors of Convict Prisons	D. J. Longher	do.
*Supply of Building Materials to Local Prisoners.	do.	Official	do.
*New School, near Rotherham.	Comms. of Prisons	do.	do.
Wing to Schools, Pentre, S. Wales.	Depy's Man Colliery Co. Ltd.	do.	do.
*Broken Granite.	Ystradgynlais Loc. Bd.	J. Rees	July 11
*Broken Granite.	Hawfield Local Board	Official	July 12
*Pipe Sewer, &c.	Widewater Local Board	O. Clouston	do.

CONTRACTS.—Continued.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Oak Clift Pencil.	Baking Town L. B.	C. J. Dawson	July 12
*Cigarette Kerb.	do.	do.	do.
*Tarmac.	do.	do.	do.
*Stoneware Sewers and Drains.	do.	do.	do.
*Fire Brigade Station, Brompton.	London C. C.	Official	do.
*Housers of Tobacco Mahogany.	G. W. R. Co.	do.	July 13
*Electric Lighting, Clapton Asylum.	do.	do.	do.
*Fire Escape Station and Residence.	Boro' of Brighton	J. Bower	July 14
*Road Stone for Drain Pipes.	do.	do.	do.
*Enlargement of Works.	Kingston Guardians	do.	do.
*Labourers' Dwellings.	Manchester Corp.	Spalding & Cross	do.
*Tavern and Keating Footpath.	Maiden U.S.A.	P. M. Beaumont	July 16
*Drainage Temple-street.	Stroud Boro'	do.	do.
*Road Materials.	Lin.	W. B. Knowlton	July 19
*Ironwork—New Municipal Buildings.	Acton Esc. Bd.	do.	do.
*Electric Lighting, Clapton Asylum.	Croydon Council.	C. Heunau	do.
*Additional Building, Banstead Asylum.	London C. C. (Asylum Committee)	Official	July 26
*Salespots, Stores, &c. Darvall, Sheffield.	Brighton & Croydon Co-op. Soc.	do.	do.
*Improvements, Zion Chapel, Wakefield.	Brighton & Croydon Co-op. Soc.	H. Webster	No date.
*Two Semi-detached Villas, Marine-avenue, Newcastle-on-Tyne.	T. A. Potts	Hart & Dawson	do.
*Road Formation, Sewerage, &c.	do.	J. W. Taylor	do.
*Woodlands Park Schools.	Derham	H. T. Graded	do.
*Wester Joint Asylum for Sumner-st.	Patersonham Sch. Bd.	Giles, Gough & Trolope	do.
*Shops, Offices, Assembly Rooms, &c.	Doncaster Mutual Co-operative, &c. Soc. Ltd.	H. Athroon	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Junior Clerk at Paris Stoneyard.	St. Marylebone Vestry	52 per week.	July 8
*Clerk of Works.	Guardians Board	25 12s. 6d.	July 23
*Teachers.	Proposed Ladies' and Men's Craft School	do.	July 30
*Accumulator Clerk, Director of Works.	Civil Service Comma.	do.	Aug. 4
*Assistant Instructor in Geometrical Drawing.	Royal Indian Engineer College	250.	No date

Those marked with an Asterisk (*) are advertised in case of vacancy. Competitions, pp. iv, vi, & viii. Public appointments, p. xx & xxi.

LAUNDRY AND DOMESTIC APPLIANCES EXHIBITION.—An Exhibition under this title is to be held in the Central Hall, Holborn, from August 25 to September 3. Special attention, we are told, will be given to sanitation in the laundry, and among the classes of articles to be exhibited will be washing machines, wringing machines, and mangling machines, air propellers, ventilators, geysers and rapid heaters, stoves, ranges, &c.

FUNERAL REFORM ASSOCIATION.—This Association held its fourteenth anniversary last week. The objects of the Association appear to be to recommend the "earth-to-earth" system of burial, to contend against useless expenditure which presses heavily on the poor, and to recommend the use of shelters or other means of avoiding the exposure of mourners to the weather in open-air services, which has often occasioned serious illnesses. On Monday, the 20th, Earl Porteous presided at a conference of the officers of the society at the Church House, when the proposition to form a company which should enable persons in all parts of the country to put into practice the society's principles was discussed, and the matter referred to a sub-committee, with a view to ascertaining by what means such a company could be formed. The question of empowering local postmasters to receive official announcements of deaths, so as to save the poorer classes the trouble of going, in many cases, long distances to the Registrar, was committed for further consideration. On the 21st ult. a drawing-room meeting was held at 21, Carlton House-terrace. Papers were read by Lady Frederic Cavendish, Miss F. Davenport-Hill, and Dr. C. M. Campbell. A paper was contributed by Mr. F. Scott, Secretary of the Sanitary Association of Manchester, contending that the Church is, by reason of her mission, the great sanitary agency. Archdeacon Donne, Dr. Norman Kerr, Professor Flower, C.B., General Lowry, Dr. F. Naedham, Mr. S. Bourne, and Mrs. Dowson, Lecturer on Medical Jurisprudence, were the subsequent speakers. In front of the house was exhibited a tent for the protection of mourners. The Bishop of Wakefield, presiding at the annual meeting at the Church House, deprecated the bad taste shown in the tall, oblong, tasteless tombstone in use in graveyards in the north, and urged the adoption of monuments which are much smaller and of Christian design.

THE SANITARY INSTITUTE EXAMINATIONS.—At an examination for Inspectors of Nuisances, held at Wakefield under the auspices of this Institute on June 10 and 11, seventy-five candidates presented themselves as Inspectors of Nuisances. Questions were set to be answered in writing on the 10th, and the candidates were examined *visu voce* on the 11th. Fifty-three candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Local Surveyors. At an examination for Inspectors of Nuisances, held in London by the Institute on June 17 and 18, twenty-three candidates presented themselves. Questions were set to be answered in writing on the 17th, and the candidates were examined *visu voce* on the 18th. The following twelve candidates were certified to be competent, as regards their sanitary knowledge, to discharge the duties of Local Surveyors.—Edwin Brown,

Burgess-hill, Sussex; Eben Connal, Glasgow; William Cooper Denny, Lambeth; Francis Edward Dixon, Walton-le-Dale; Harold Griffiths, London; John Wright Kirk, London; Christopher Lloyd, Brompton; Henry Miller, Norwich; Lewis Mitchell, Hurford, Kilmarnock; Reginald William Newman, Beckenham; William Henry Stanbury, Shorecliffe Camp; and Fred Spencer Yates, York.

TRADE EXCURSION.—On Saturday afternoon last the clerks and foremen in the employ of Messrs. Brass & Son, the well-known builders and contractors, journeyed to the "White Lion" Hotel, Cobham, Surrey. A cricket match first took place between the clerks and foremen, after which about seventy sat down to a cold collation. All the arrangements were well carried out by Messrs. Eveleigh and Morrison.

IMPROVEMENTS AT LANCASTER.—At the Lancaster Town-hall, on the 22nd ult., Mr. Arnold Taylor, Local Government Board Inspector, held an inquiry in reference to a proposal by the Town Council to borrow £12,300 for street improvements, new roads, fire brigade, market, baths, and other purposes; £15,000 for works of water-supply; £2,600 for the extension of the municipal buildings, a total of over £30,000. There was no opposition, and after the various proposals had been gone into, the Inspector intimated that he would make his report to the Local Government Board.

BUSINESS CHANGES.—Mr. Thomas Drew, of 225, Upper Thames-street, and 113, Queen Victoria-street, informs us that in order to arrange a division of the business carried on under the styles of "Rawson, Drew, & Co.," and "George Wright & Sons," the partnership existing between himself, his son (Mr. Lewis Harry Drew), and his nephew (Mr. T. Drew Bear), is dissolved by mutual consent, from June 30. Mr. Drew and his son retain the bar iron, steel, hardware, and stove and range businesses, and will carry them on in the names of Rawson, Drew, & Co., and George Wright & Sons, as heretofore. His nephew (Mr. T. Drew Bear) takes over the engineering department, which has always been under his management. Mr. T. Drew Bear at the same time announces that he has taken into partnership Mr. Frank Ransome, of Ipswich, and Mr. E. Hollis Perks, and that the business will be carried on in the name of Drew Bear, Ransome, & Perks, at 71, Queen Victoria-street, and at Prince's Wharf, Lambeth.

ELECTRIC LIGHTING FOR LEEDS.—According to the *Leeds Mercury*, the Yorkshire House-to-House Electricity Company, which has acquired the right (subject to certain powers of purchase by the Corporation) to supply electricity for lighting all other purposes in Leeds, hopes to have the works completed by November 1. The directors have decided to proceed at once to lay the mains in the principal streets.

PROPOSED IMPROVEMENTS, BURNLEY.—On the 21st ult. Mr. Arnold conducted a Local Government Board inquiry at Burnley, relating to an application by the Council to borrow £29,000 for a scheme of electric lighting which has already been provisionally adopted. The inquiry also embraced applications to borrow 11,000, for gas extensions; 2,700, for street improvements; 2,000, for recreation-grounds; and a minor sum for market and slaughter-house improvements.

CAPITAL AND LABOUR.

THE STRIKE OF BRICKLAYERS AT BIRMINGHAM.—On the 23th ult. the bricklayers on strike at Birmingham met at their headquarters in Navigation-street to consider the offer of the master builders, as submitted through Mr. T. M. Colmore, the stipendiary. As the result of a full discussion of the subject, the men resolved to accept the terms proposed by the masters, and passed a cordial vote of thanks to the stipendiary for his efforts to bring about an amicable settlement of the dispute. The strike has lasted fourteen weeks.

MEETINGS.

SATURDAY, JULY 2.
Edinburgh Architectural Association.—The Sketching Class to meet at Roydon House, Carlotta Park, Granton, to make measured drawings and sketches of the south front of the mansion. 3 p.m.
TUESDAY, JULY 5.
Glasgow Architectural Association.—Mr. J. E. Potts on "Materials: Local Building Stones." 8 p.m.

WEDNESDAY, JULY 6.
Royal Archaeological Institute.—(1) Professor B. Lewis on "Antiquities at Buns Peck." (2) Mr. Robert Munro "On the Pictish Stone versus Sichel." 4 p.m.
Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.
SATURDAY, JULY 9.
Architectural Association—Visit to Colonel North's House at Ethham, and to Ethham Palace. Train leaves Cannon-street at 1.45 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.
19,770.—DOOR INDICATORS: R. Hodges and F. J. H. Lilley.—This is an invention relating to the construction and arrangement of indicators for attachment to doors, showing words such as "Engaged," "In," "Out," and the like. It consists in the construction of a door-faster and indicator in one piece of apparatus, controlled by the simple movement of the bolt, knob, or handle.
19,849.—SANITARY PIPES: W. Deanning.—This invention refers primarily to sanitary or drain pipes of earthenware or stoneware, but may also be applied to iron or other pipes, and has for its object to provide a water-tight and air-tight joint between the ends of two pipes without the use of liquid cement to be run into the joint. It consists essentially in forming the pipe ends or sockets a shape that the cement may be placed on the upper surface of the pipe and carried into the socket, and when there be bumped tightly into all the joints. The spigot end of the joint is constructed with a shoulder or ring, which will be water-tight and air-tight joint when in position, and a corresponding shoulder or ring in the socket near its base; so that when one is placed inside the other the joint will zigzag on the form of one or more steps. The cement is placed on the spigot-end of the pipe before being inserted into the socket, and is carried in through the joint. The cement coming against the shoulder on the inner surface of the socket is compressed between that shoulder and the shoulder on the spigot, and is thereby forced or bumped into all the interstices.

The cement also forms a ring round the pipe, besides filling the joints.

12,762.—ORNAMENTAL PANELS: W. S. Morton.—This invention is for producing ornamental panels of decorative materials, presenting modelled surfaces or lowly raised worked, not likely to chip or crack, and which can be applied to walls, ceilings, or other surfaces. It consists in the application to the back of embossed canvas of an adhesive paste, such as may be made with glue, size, whitening, and plaster of Paris, and a coating or covering of plaster of Paris or cement, with or without the interposition of "scrim" on open-weave fabric between the layers of plaster or cement, and with or without the insertion of woods, vitreous mosaics, or other decorative materials.

5,401.—PAINT BRUSHES: L. Z. Jenkins.—This invention consists of what is claimed to be a novel means for connecting the bristle of a paint or other brush with the handle, also comprising a ferrule or a brush, consisting of wire in the form of a coil, the ends of which form hooks for the connexion of the bristle of the brush, the said hooks being integral with the remainder of the ferrule, thus producing a convenient and strong device for the purpose intended. There is also a flattening the bristle of the coils of the ferrule, so as to produce an unbroken surface for the contact of the bristles.

6,031.—BRICK MOULDING MACHINES: H. W. Mead.—This is an invention relating to apparatus for making bricks, and comprises a circular saw bench with continuous roller feed for re-sawing deals and batens, also for surface planing, jointing, and thickening, and also for producing a consistent and strong device for the purpose intended. It consists in the improved construction, arrangement, and combination of parts, fully described and illustrated in the specification.

NEW APPLICATIONS FOR PATENTS.

June 13.—11,659. P. Powell, Pipe Joints.—11,663. E. Wethered, Latches, Locks, and Door Furniture.—11,665. S. Jetterley, Brick Machinery.

June 14.—11,211. T. Paddon, Window-sash Fastener. June 15.—11,666. The Vacuum Ventilator and Sewerage Destructor.—11,611. S. Jetterley, Brick Machinery, Checks and Closers.—11,463. A. Struholm, Tiles.—11,170. G. Parker, Construction of Floors, Ceilings, and Roofs of Buildings, also applicable to the construction of sheds and sheds.—11,319. B. K. W. H. B. Vertical Band Sawing-machine.—11,193. P. Bright, Water-closets.

June 15.—11,207. W. Turner, Frames for Ship's Doors.—11,211. G. Gibson & W. Co., Heating Bakers Ovens with gas.—11,212. W. James, Facia.—11,215. F. Shuffrey, Window Sash-fastener.—11,227. S. Bratne & Co., Hackett, Combination Screw Nail.—11,233. C. Maxted & Co., Bolt Preventing the Vibration or Rattling of Sliding Windows.—11,241. W. Lancaster, Laying Concrete, Cement, and other similar materials for foot-paths, floors, and other purposes.—11,262. C. Raymond, Brick-making Machine.

June 16.—11,288. W. Richards, Upholstery.—11,293. B. Hautmann, Circular Saws, or Circular Sawing Machine.—11,299. O. Helzer, Boarded Floors.—11,300. H. B. Turner, Producing Flat Reliefs for Wall Papers.—11,300. H. Ball, Self-locking Window-sash Slide and Fastener.—11,361. S. Adams, Drain-letting.—11,373. J. Thompson and Others, Bakers Ovens.—11,381. J. Rogers, Lathing Clatern.—11,384. A. Cochrane and H. Sheridan, Making Roadways, Footpaths, Covers for Streets, Constructional Staircases, and all other Surfaces required to be non-slippery.

June 18.—11,407. C. Hall, Enamelled Bricks and Tiles.—11,410. J. Campbell and C. Cameron, Safety Door or Gate for Hoists or Lifts.—11,411. J. Dougan and Others, Erecting and Repairing Chimneys.—11,412. C. Cameron, Safety Gate for Hoists.—11,447. H. Wood, Fire Gates.

PROVISIONAL SPECIFICATIONS ACCEPTED.

7,784. J. Yolante, Window fastening device.—7,927. J. Cardland, Hinges.—8,781. A. de Murat, Spring-loaded Door-locks.—8,920. J. Lockwood, Closing and Latching Doors.—9,235. T. Rymer-Jones, Refractory and Non-combustible Retaining Walls, and Pipes.—9,599. J. Grubb, the firm of C. Oliver & Co., Sliding Doors, Fans, and Blowers.—9,765. R. Hancock, Ventilators or Chimney Cowl.—9,950. C. Hill, Door stops and Draught Excluders.—9,986. G. Gwillim and H. Swan, Tool or Apparatus for Carving Wood, Stone, or other material, or for Boring or Drilling Holes in the same.—10,236. J. Gordon, Sash-fastener.—10,248. T. Voce, Lead Lugs.—10,253. J. Turner, Sawing or Preserving Wood.—10,341. H. Sankay, Decorating Walls.—10,407. W. Shaw, Reversible Window-sashes.—10,476. W. Horn, Dry Locks.—10,513. C. Hibberd and R. Lowman, Window-sashes.—10,601. A. King, Ventilators.—10,673. H. Tuke, Brick-cutting Tables.—10,774. W. Junge, Cutter for Penoning, Mounting, Grooving, and similar purposes.—10,765. W. Ward & Sons, Ltd., and W. Ward, Brick presses.

COMPLETE SPECIFICATION ACCEPTED.

(Open to Opposition for Two Months.)

14,476. J. Trimming, Combination Instrument for the use of Architects and Surveyors.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

June 17.—By Messrs Cobb (at Sittingbourne): "Vigo Farm" near Sittingbourne, 5a. Or. 3p., 1,800; "The Swan Inn" Greenhithe, 1a. Or. 1,400; 1 freehold house and shop, r. 24f. 60d., freehold cottage, r. 6s. 6d., freehold house, shop, and garden, Bapchild, r. 18s. 36d.

June 20.—By Duchland & Sons: "The Noah's Ark" beer-house and two cottages, Stanwell, f. 740.—By D. J. Chattell: 4, Stockman's row, Clidehurst West, f. 550, 1,000.—By Nokes & Nokes: 4 and 5, Laurel-terrace, f. 1,000.—By Nokes: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

and 10, Denmark-st., u.t. 27 yrs., g.r. 47, r. 841. 188. 615d.; 6, Cromwell-rd., Holloway, u.t. 71 yrs., g.r. 52. 108.; 1501, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

The Builder.

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New Business Buildings of Chicago.



CHICAGO is the only American city that can claim a distinctive architecture. It is a business architecture, modern in every sense of the word, and the outcome of narrow limitations characteristic of all American cities, but which in Chicago have received fuller, freer, and more satisfactory treatment, both from a structural and architectural stand point, than elsewhere in America. Chicago architecture, though much talked of, is not appreciated, the public hears more of its height than of any architectural merits it may have, and even the sensible manner in which it meets exacting conditions has scarcely been done justice to.

Chicago architecture,—we refer only to the newest office buildings as typical of the most recent advances,—is an attempt to meet the rigid limitations which surround building in that city and which quite preclude the possibility of following established methods of procedure. Hemmed in by the Chicago River and Lake Michigan, the business portion of the city is of unusually small size; the high office building, made successful by the invention of swift-running lifts, solves the question of area by multiplying it indefinitely. Not altogether so, because under ordinary systems of construction the walls of very high structures would be enormously thick, and much valuable space would thus be lost from the renting value of the building. This difficulty is obviated by the introduction of steel construction, skeletons of steel surrounded with a light stone or a brick wall. Thus the Chicago architect had to prepare a building which would have the greatest possible floor space, which could neither extend beyond the building line or recede within it, that must be as high as the funds at hand permitted, and which should be constructed as economically as possible.

The programme was unalterable, and the first step was to discard traditional methods and styles more suited to monumental edifices

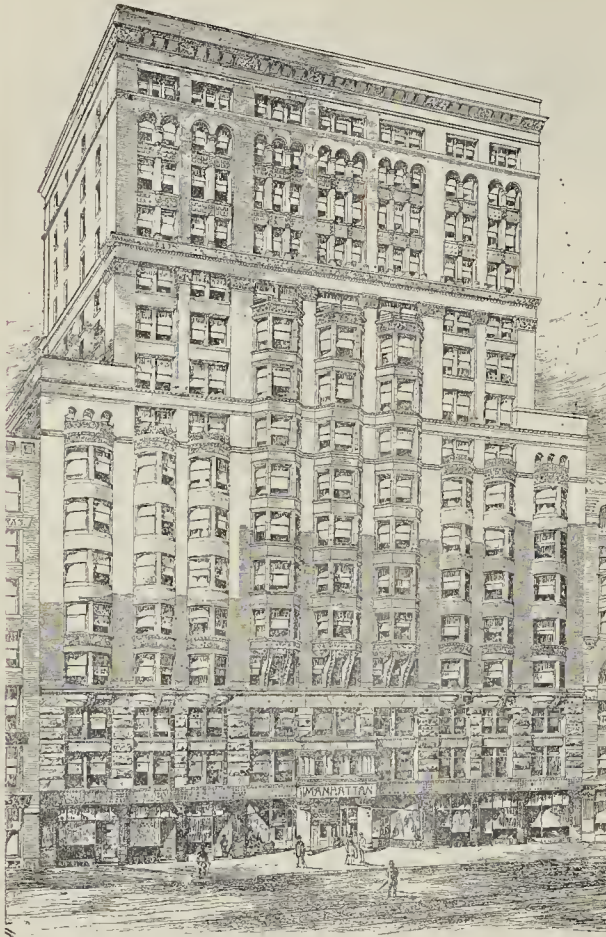
than the business buildings in which the question of rents is of so much importance. The high building, eight to twelve stories high, is a feature of all American cities, but nowhere have the architects so freely put precedent to one side, and followed the programme so closely as in Chicago.

Chicago has a dozen or more large office buildings either recently completed or in process of construction, and all within a few blocks of each other, averaging sixteen stories in height. The "Manhattan," the "Unity," the "Ashland Block," the "Title and Trust," the "Monadnock and Kearsage," are a few very recent buildings each sixteen stories high. The new Masonic Temple, the lower floors of which are used as offices and shops, has eighteen stories. It is obvious that a flat wall of this altitude, or a wall nearly destitute of the relieving qualities of mass or of grouping, offers a problem of almost unprecedented difficulty for successful treatment. New York, although it has many high buildings, has none as lofty as those of Chicago, yet they are quite high enough to render their general architectural arrangement of basement, superstructure and cornice or attic altogether unpleasing, because these features become unmeaning when spread over too great a space. The Chicago architects have followed a very different course: they have recognised the utter impossibility of "making" façades, and have suppressed all unnecessary ornamentation and architectural features, leaving their buildings simple walls relieved only by windows, or, perhaps, by bow windows.

The "Monadnock," for example, has a series of windows alternating with shallow bow-windows, without ornament of any kind, no strings or piers, or even hoods or sills, to the windows, which are all of one design and almost of one size. The larger front of this building contains 389 window openings approximately of one kind. The main portion of the front of the Masonic Temple contains 300 similar windows, which, like those of the Monadnock, are without any architectural adjuncts. It might readily be supposed from such figures that the high buildings of Chicago are utterly monotonous in design and thoroughly devoid of architectural interest. If architecture be simply an ornamental art of ornamental

construction, then perhaps the Chicago buildings may not come within its scope, but if architecture be the meeting of conditions in building in a manner suited to the conditions, regardless of what might have been done under other circumstances, and for other purposes, they are clearly architecture, and very good architecture to boot. They are too high and too big to be designed in the methods employed in small structures, even the great width of many of them,—the Masonic Temple has a frontage of 170 ft, the "Manhattan" 150 ft, the "Title and Trust" 60 ft,—which gives a much-needed dignity to the immense height, renders it impossible to cut up the fronts in any satisfactory way. They have been left, as it were, in their natural state, frankly expressing the business uses of the building, and the business conditions under which they were built.

The "Monadnock," with its shallow bow-windows and total absence of ornament, is a typical Chicago building, because in its conditions imposed upon architecture in that city are most completely and thoroughly illustrated. The same may be said of the Masonic Temple, for while it has a stone basement, an attic, and a gabled roof, the lines of the superstructure are only slightly accentuated, the series of bow windows extremely shallow, and there are no horizontal lines but those furnished by the frameless windows in the twelve middle stories. The Title and Trust Co.'s building has a basement of four stories, then nine stories of plain windows, six pairs in the centre flanked by slight bow windows; then two stories of similar design separated with string courses but without bow windows, a balcony, another story and an attic of round-headed windows. The traditional division of the front is followed after a fashion, though the unornamented superstructure is in the peculiar Chicago manner. In the "Unity Building" the lower two and a half stories form a basement of red granite. The upper part is entirely of buff terra cotta and pressed-brick. It consists of two portions, the lower with nine stories and three bow windows, separated by pairs of windows. Above is a deep, horizontal course under three stories without bows, and in which the windows are separated by pilasters which do



The Manhattan Office Building, Chicago.—Mr. W. L. B. Jenney, Architect.

not appear in the lower portion of the facade. Then comes another horizontal band surmounted with a single row of round-headed windows, and above a small attic and cornice. The "Manhattan Building" is even more varied, and the contrast between this front, in which the architect has tried to compose a design, and those in which such efforts have not been made is very striking, and much to the advantage of the latter.

For typical Chicago buildings impress by mass, not by detail. Their finest quality is that of immensity, and the less the fronts are broken up, the less the walls are interrupted by piers or by strings, the more imposing the structure and the more tremendous the effect. Naturally enough, buildings in which such a quality predominates cannot be appreciated from drawings or photographs; they must be seen to gain the full effects of their merits. The Masonic Temple, for instance, is one of the least satisfactory structures in the world on paper; standing before it one is overpowered by its immensity, and its power; the building itself has a real and genuine merit in its mass which renders it as admirable in reality as it is unpleasing in reproduction. The same is true of most of the other new buildings, a quality quite their own and not the least surprising one.

The "Auditorium Building" is very different from any of the structures already noticed.

The largest building in Chicago, it ranks as one of the largest buildings of its kind in America, occupying about $1\frac{1}{2}$ acres, and having a total street frontage on three streets of 710 ft. Originally planned as an opera house, the building includes the auditorium or theatre, and recital hall, surrounded by an hotel and office building, the idea being that the income from one part may offset any deficiency in another.

While not designed in what we have termed the typical Chicago manner, the "Auditorium building" impresses by mass, not only because of its size, but because, notwithstanding its utilitarian and business uses, it has a monumental aspect, dependent not only upon the sobriety of the design, but upon the dark grey granite and Bedford stone of which it is built. The three lower stories of rough-faced granite form a basement, in which the windows are restricted sufficiently to give as much wall space as possible. Above, the wall is relieved by an arcade, extending through four stories, of very slightly recessed arches, interrupted only at the corners, where a broad piece of wall gives a much-needed strengthening. Above are a series of round-headed windows in pairs, two stories high, with projecting sills forming a disconnected string course on each front. An attic of wide, square-headed windows, divided by columns, with a string below and a cornice above,

crowns the whole. The tower, placed towards one end of the longer side, is, with the exception of the balcony on the lake front, the single marked feature of the exterior, though the vigorously arched entrances and heavy columns of the first story might likewise be considered as ornamental. The necessity of utilising every inch of space has precluded the extension of the tower beyond the wall of the building itself, and its lower part has not therefore that individuality of mass which might reasonably be looked for in a building of this size. The treatment of the tower is the same as that of the main structure to the cornice, which is repeated immediately above the roof line. Three stories of windows are enclosed in a shallow arcade above which is a boldly modelled colonnade with a machicolated cornice as the finish.

Interiorly the "Auditorium" contains some of the finest decorative art in America. The theatre and its approaches, the public parts of the hotel, and the splendid banquet-hall are superbly and richly decorated,



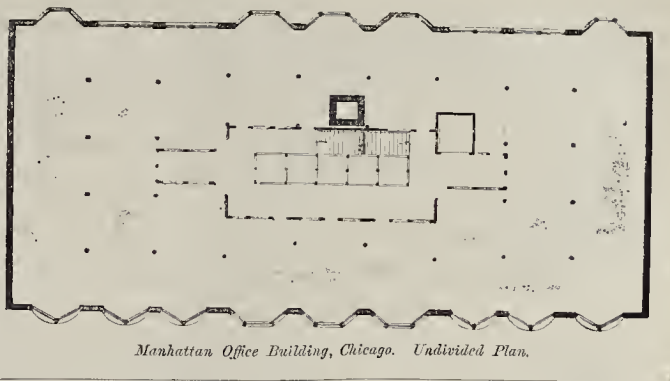
Chicago Title and Trust Company's Building.—Mr. H. I. Cobb, Architect.

and in a manner that helps the architecture without overloading it or becoming intrusive.

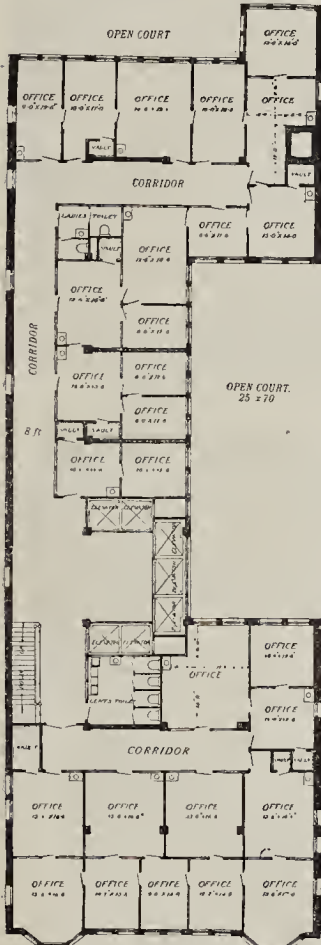
If the plan of a building is the basis of which the facade is only an expression, it may readily be supposed that the Chicago buildings, which offer so many novelties in design, would exhibit similar originality in planning. This is true to only a limited extent, since the interior of an office building, being put to a number of similar uses, may very properly be much like any other office building. The merits of the plans of the Chicago buildings consist, therefore, more in the ingenuity with which variously-shaped areas are filled than in any especially marked feature. Again, all the newer buildings are erected undivided, so that the floor space may be cut up to suit tenants, and they are thus, in a measure, independent of the arrangements of the architect. The "Manhattan Building" may serve as a type of rectangular structures in which both the longer sides are open to the light, a very unusual arrangement. The plan of the undivided story is simply an immense rectangle enclosing a smaller rectangle, with stairways

and lifts, and without any dividing walls whatever, the weight of the building being carried by a series of columns and piers distributed at proper intervals.

The Title and Trust Co. building may serve as an illustration of an oblong edifice in which the narrow side only is open to the street. Here a court becomes an integral part of the plan, and is placed at one side and at the centre, while another smaller one gives light to the rear rooms. The offices are arranged in double tiers facing the windows, being intended to be let in pairs or more, each tenant having an inner and outer office. This building is provided with seven lifts. The Masonic Temple is a large rectangular building at the corner of two streets, the two



Manhattan Office Building, Chicago. Undivided Plan.



Title and Trust Company's Building, Chicago. Plan of 5th to 16th floor.

oides opening, the one on to a narrow street, the other on to a court. The size of the building, and the insufficiency of the light to be had from two of the surrounding thoroughfares, renders a large central court necessary. This is covered at the top, and is surrounded with open balconies so far as to the ninth floor, above which the corresponding space is taken by offices, the corridor being placed further in, and having a row of offices on each side, one of which is lighted from the street, the other from the court. Fourteen passenger-lifts and two freight-lifts are needed in this building, and are arranged in a seven-sided figure immediately beyond the court. The ten lower floors of this structure are intended to be used for

shops and stores,—a novel idea which is as yet not in operation. The remainder of the building, except the two topmost floors, are planned for offices, the special arrangement of which depends somewhat upon the requirements of the tenants.

The great office buildings of Chicago are looked upon by their owners simply as sources of revenue, not as architectural monuments. Such, indeed, an office building cannot properly be; but it is to the credit of Chicago architects that they should have produced not only a characteristic group of buildings, but buildings well worth studying as examples of the most modern tendencies in architecture and their expression in architectural form.

Chicago architecture must be estimated by the Chicago standard. Whatever opinion may be held as to the characteristics of Chicago life, its rush and turmoil and business proclivities, it should be remembered that these elements are as much part of the city as a more staid and regular existence is of older communities. These are the conditions that Chicago architecture is concerned with, and if it fulfills them it must be pronounced as successful as other forms of architecture and methods of treatment may be for other communities. One does not find fault with a warehouse because it does not resemble a church; there is nothing in a church that would make its architectural form of any utility or sense in a warehouse. So if Chicago architecture, while differing from that of the other cities, fulfills Chicago requirements and is satisfactory to those who have to use it, it becomes visitors to criticise it because it may differ from their preconceived notion of what architecture should be. The buildings may be preposterously high, but they are so from business conditions, not from architectural choice. The Chicago architect does not build high because he likes it, but because the problem presented to him forces him to do so, and his success lies in his frank and business-like treatment of the buildings. Just as a church is the more successful the more completely it answers the requirements of a church, so the success of the Chicago building must be measured by the completeness with which it answers to Chicago requirements. And this position, perhaps fortunately enough, entails no approval of whatever hoisterousness may be characteristic of the city.

NEW SCHOOL, COCKINGTON, DEVON.—On the 20th ult. a new school was opened at Cockington, Devonshire. The school, which is of the Gothic style, has been built by Mr. G. K. Smale, of St. Marychurch, from the designs of Messrs. Rowell & Sons, of Newton. The main room, to be used as a mixed school, is 50 ft. 3 in. by 20 ft., and will accommodate 116 children. Connected with this is a class-room affording space for twenty-one children, while in the infant school, which is 36 ft. by 18 ft., there is accommodation for eighty children. The building is of local sandstone, faced with white bricks and Bath stone. The rooms are ventilated with Kite & Co.'s ventilators in the roof, and Lawrence, Thomas, & Co.'s side ventilators. All the rooms are warmed with open fireplaces, and gas for artificial lighting is also provided.

STEAM ROAD-ROLLING.

BY ALLAN GREENWELL, ASSOC. M. INST. C.E.

IN September last (1891) the writer was invited to prepare a report on the cost of steam road-rolling from the experience obtained by its use upon the roads under his charge, for the use of the County Works Committee of the county of Somerset. This report became the basis of a resolution passed by the Somerset County Council at the quarterly meeting held at Wells in October, offering the various contracting highway authorities in the county the sum of 10s. per cubic yard for all stone rolled in by the steam roller, subject to the quality of the stone being approved by the County Surveyor.

The Frome Highway Authority ordered this report to be printed, and it has since been reproduced in many of the leading papers of the day. The kind reception which it has received, and the constant inquiries from members of county councils, surveyors, and others interested in the subject, have led to the belief that a short account of the work done by the steam-roller during one year, giving the actual cost under the various heads, together with such further particulars as would appear necessary for purposes of comparison, would be acceptable to the largely increasing body of those interested in the question of steam-rolling on roads.

The Frome Rural Sanitary and Highway Authority's District, No. 1, is situated in the county of Somerset, and comprises ninety-one miles of district and thirty miles of main road. It contains twelve parishes, with an area of 28,058 acres, and a population of 6,924.

The town of Frome, which is a Local Board District, and manages its own roads, is situated nearly in the middle of the rural district. It has a population of 11,464, and carries on the manufacture of woollen and other cloth. It is, however, principally an agricultural town.

The rural district is almost entirely agricultural, but there is a considerable traffic over the roads due to coal, stone, and heavy timber hauling. The district is very hilly.

The stones used are all quarried in the district, and consist of:—

1. Blue Rock or Mountain Limestone.
2. Dug Flints.
3. Tough blue Sandstone (Lower Oolite).
4. Grey Limestone (Lower Oolite). Very little used.

The steam-roller was purchased by the authority in March, 1888. It was made by Messrs. Aveling & Porter, of Rochester, weighs ten tons, and rolls a width of 6 ft. 3 in.

The staff consists of three men, namely, engine-driver at 3s. 4d. per day, and two sweepers at 2s. 8d. and 2s. 4d. per day respectively, the former acting as steam-roller foreman.

There is a sleeping-van which travels with the roller and contains two berths; the third man being allowed 6d. a night for lodging-money when the roller is more than three miles from Frome.

There are two water-barrels containing 175 and 130 gallons respectively. Unless the distance from which the water has to be brought is great, or the road very hilly, the larger barrel is sufficient by itself. From 1,400 to 2,800 gallons of water are required per day, depending upon the weather, and including about 200 gallons for the hoiler.

The horse-hire is supplied by contract, and varies from 7½d. to 10d. per hour's work, for one man and one horse.

The coal is delivered to the steam-roller at any part of the district at 1s. per cwt.

Best lard oil is used for lubrication. From January 29, 1891, to January 29, 1892, the steam-roller worked as follows:—

	days.	days.
Main roads	127	
District roads	120½	
County bridges (on district roads) ...	9½	
		251
Let out on hire	1	
Cleaning out boiler	20	
Travelling over district	8	
Stopped for repairs	7	
by frost or snow	2½	
Holidays	4½	
		62
Total		313

Taking overtime and short days into account, the 251 working days are equal to 265 days of nine hours each.

During this period 169,725 superficial yards of road have been rolled, and 9,141 cubic yards of stone consolidated, made up as follows:—

1. Blue Rock	7,474
2. Sandstone	1,467
3. Flints	200
	9,141

making an average of 606 superficial and 34½ cubic yards per day of nine hours.

The cost was as follows:—

	Total cost.	Cost per day of 9 hours.	Cost per cubic yard consolidated.
	£ s. d.	£ s. d.	s. d.
Engine-driver's wages ..	53 13 4	1 4	1 4
Sweepers do. ..	68 1 4	1 7	1 7
Horse-hire ..	150 17 3	4 0	4 0
Coal and wood ..	53 13 0	1 4	1 4
Brushes, oil, &c. ..	13 5 1	0 3	0 3
	337 10 0	1 6 8	8 8
Estimated allowance for depreciation and repair of steam-roller and 2 water barrels, at 20 per cent. per annum ..	68 0 0	0 5 2	1 8
	405 10 0	1 10 8	10 6

The cost per day of nine hours was, therefore, been 17 10s. 8d., including everything, and the cost per cubic yard of stone consolidated, 10½d.

By various economical reforms the rate for horse-hire has been reduced from 1½d. per cubic yard at the commencement of the year, to 2½d. at the present time, thus making the total cost about 9d. per cubic yard.

From careful experiments with the blue limestone it has been found that to obtain consolidation with the usual coating of two stones in thickness (each cubic yard broken to 2½ in. gauge, and made to cover about 17 superficial yards of road), the steam-roller must traverse a patch equal to its own width about thirty-five times. From this it appears that a cubic yard of broken stone requires 1½ ton miles of rolling to produce consolidation.

For finding, about 5 per cent. of well-weathered road-scraping is spread over the surface when consolidation is nearly effected. Without the use of binding, consolidation is found to be impossible.

Experience of the roads in the Frome district has shown a considerable saving both in materials and manual labour due to the use of the steam-roller, at least 25 per cent. of the former being saved as compared with stone worked in by the traffic; and, as regards

the latter, all after-raking is avoided, and scraping is reduced to a minimum.

The saving to the users of roads by the use of the steam-roller is too obvious to need remark. The actual economy, however, in road maintenance must depend upon four points:—

1. The cost of a cube yard of material spread upon the road.
2. The cost of after-raking, per cube yard, when the stone is left to wear in by the traffic.
3. The cost of steam-rolling per cube yard of material spread.
4. The proportion of material saved by steam-rolling as compared with the material worn in by the traffic.

In the Frome district, where the material is plentiful and of excellent quality, the average cost when spread upon main roads is 5s. 3d. per cube yard. The cost of after-raking may be taken at 2d. The cost of steam-rolling, as already shown, is 9d.; and the writer's experience points to a saving in material by steam-rolling of at least 25 per cent. The actual economy in road maintenance due to the use of steam-rolling is, therefore, nearly 9d. a cube yard.

It will be apparent that the economy will rapidly increase as the value of the material rises.

As it is necessary to keep a very careful watch over the daily work, the steam-roller foreman fills up a printed form on a post-card, which he sends to the surveyor each night, giving the number of superficial yards rolled, the number of cubic yards consolidated, the number of hours at work, and other particulars. These figures, after being checked, together with all items of cost, are entered upon special forms, designed by the writer, and presented to his Board at each monthly meeting.

WHILE we lament the decision of Mr. Justice Chitty in regard to Emanuel Hospital, it perhaps must be admitted that no other is practically possible. The property comes has much decreased in value, while the site on which the old building stands has greatly risen in value, and the building itself it is said, needs extensive repair or almost rebuilding to render it habitable. It would seem rather contrary to the objects of a charity that those who administer it should be precluded from raising funds for the purpose by the sale of a building which is not in condition for use, because the building is a picturesque one and interests many persons. So far we cannot but feel that the Judge's view is that of common sense. It is on the question of the open site that there is another word to be said. The building up of an open space like the Hospital quadrangle, in a neighbourhood already so overcrowded with buildings, and there are therefore interests to be considered on both sides of the question, other than those of mere æstheticism. The loss of the open space, especially if a monster block of flats is to be erected on it, will undoubtedly be a public detriment, though we do not see how this consideration can be legally brought to bear on the proposed sale. There is however the possibility of the purchase of the building and land by public subscription for the purpose of preserving them. We fear it is not very likely that money will be raised for that purpose, but it might be worth while for those who are most interested in the preservation of the building to invite support for a scheme of purchase, and see what resulted from the invitation.

IT was not so many months ago that an

attack in the public prints was made by some land and house agents against solicitors for taking or demanding certain commissions on the transaction of business with land agents. It must be confessed that, judging from the case of Gillow v. Lord Aberdare, which was tried last week, the principles on which land and house agents act are not always such as to command themselves to the minds of reasonable men. The action in question was brought by Messrs. Gillow to recover commission from Lord Aberdare. The plaintiffs had been employed by the defendant to let or sell his London house, and they duly let it. After occupying the house for a certain time, the tenant decided to buy it; but when he took it as tenant he had no formal option to purchase, and the transaction, so far as regards Messrs. Gillow's employment was concerned, had come to an end. But they relied on an alleged custom to the effect that a house agent who lets a house has a right to a commission on its sale if it is subsequently purchased by the tenant. The alleged custom is not only obviously bad from its vagueness, for no limit of time during which the right to commission remains in force was stated, but, also, it is a practice which has not the general application of a custom. No doubt, house agents do try to make this a practice, but, without a special contract, it clearly is altogether invalid. Moreover, without such special contract it cannot be justified, because it is, in effect, a demand to be paid though no work has been done. The work done has been the letting of the house, on which commission is duly paid, but the sale is a matter in regard to which the house agent has done nothing to entitle him to remuneration. It need hardly be said that the Judge decided the case in favour of Lord Aberdare; and should the action be taken to the Court of Appeal, there can be no doubt that the result will be the same.

WHY should Friday be consecrated to science? On Friday most of the leading scientific and technical papers appear, on Friday the "echoes of science,"—sometimes strangely distorted,—resound in the *Globe*, and on Friday the Physical Society

NOTES.

THE Congress of Chambers of Commerce last week, several of our Colonial visitors bore testimony to the great value of conciliation boards for settling labour disputes. The Premier of New South Wales (Mr. G. R. Dibbs) advised employers to treat the trade unions with perfect frankness, and paid a tribute to the intelligence of the working classes of Australia. The manner in which labour leaders at home have conducted some recent disputes does not say much for their sagacity; but if the experience of the past has the effect of making the workers adopt more rational methods, and choose better men to represent them in their differences with their employers, there will be brighter prospects for the future. Mr. S. B. Boulton, Chairman of the London Conciliation Board, declared that many of the men who had been sent up by the trades unions of London to discuss differences before the Board proved themselves fully capable of dealing with the questions at issue, and conducted their case in an admirable manner; but at the same time he strongly deprecated the interference of professional agitators. We doubt not that by this time many of the members of the unions will be quite ready to echo this sentiment. The result of the discussion at the Congress was the unanimous adoption of a resolution recommending the formation of, "properly constituted Boards of Conciliation and Arbitration in all important centres of industry and commerce throughout the empire." The legislature of Belgium has recently been grappling with this question, and has sanctioned the appointment of a Council of Labour, consisting of an equal number of representatives of labour and capital, and of specialists in social questions. We are evidently feeling our way to something of this nature, but we move slowly and cautiously in such matters. The formation of effective Boards of Conciliation would, undoubtedly, do much to prevent the recurrence of the disastrous disputes of the last few years, and also obviate the necessity for an undue amount of State intervention.

holds its meetings. It was therefore appropriate that the Conversazione of the Institution of Electrical Engineers should take place on Friday, July 1. The perfect weather doubtless helped to swell the number of the guests that crowded the spacious rooms of the Royal Institute of Painters in Water Colours, and were received by the President of the Institution and Mrs. Ayrton. Amongst those present were Lord Kelvin (President of the Royal Society), the Hon. Lyulph Stanley, Sir Benjamin Baker, Sir David Salomon, Sir Henry Mance, Sir H. Dalton, Mr. H. W. Christmas (Servian Consul-General), Professor Foster, Professor Crookes and Professor Hughes, Mr. W. J. Hammer (who represented the American Institute of Electrical Engineers), Dr. John Hopkinson, Mr. W. H. Preece, Professor Perry, Professor Forbes, Professor Meldola, Dr. Frankland, Dr. Gladstone, Mr. Diggle, Mr. E. Woods (Past-President of the Institution of Civil Engineers, Mr. J. W. Swan, Dr. Ludwig Mond, Professor Adams, Mr. E. Graves, Mr. Harrison, and Dr. Sumpter. The Band of the Royal Horse Guards performed an excellent programme of music during the evening, under the direction of Mr. Charles Godfrey, and the company did not break up until close on midnight.

WE have received a copy of Mr. T. W. Thompson's report to the Local Government Board on the sanitary circumstances of the Brownhills Urban Sanitary District, consequent upon a representation made last year by the Staffordshire County Council to the Local Government Board, to the effect that the Public Health Acts had not been properly put in force within the district of the Brownhills Local Board. Among the circumstances mentioned in Mr. Thompson's report we find the following:—

"A considerable number of the houses are devoid of eave spouting, and in some cases the surface drainage is deficient or defective, circumstances which conduce to the dampness of dwellings. Many yards are unpaved, and in some cases ashes were found heaped or strewn about them. In others, stop-waters were found lying in pools within short distances of the dwellings.

Where sinks are provided within the houses they usually discharge simply through a hole in the wall—the sink waters running down the outside of the wall to find their way to a channel or gully below. This arrangement obviously keeps the wall in a damp condition, and, in not a few circumstances, the sink-waters were found soaking down towards the foundations of the houses.

Water Supply. — Three hundred and forty-one houses within the district are supplied with water from the mains of the South Staffordshire Waterworks Company; but the remaining villages and houses (some 2,000 of the latter) are dependent upon wells. These wells vary in depth, but taken as a class, they are of very defective construction, and are frequently surrounded by obvious sources of pollution. Internally they are simply dry stoned, no attempt having been made to prevent water finding its way into them through the upper layers of the soil. In certain instances liquid, coming from the direction of middens, was observed trickling into the wells. Some of the tenants are aware of the impurity of the water of these wells, and are, in consequence, compelled to send for drinking water to other wells, which in some cases appear little less open to suspicion than those discarded.

The Brownhills sewage is conveyed to a sewage-farm belonging to the Local Board, the effluent ultimately finding its way into the Claybanger brook. . . . At the time of my visit the subsiding tanks of which there are two, having each a capacity of 9,000 gallons, were practically full of black offensive sludge, over the surface of which sewage was trickling to find its way into the main carrier. Some men, were, however, engaged in attempting to empty the tanks, a process, I was informed, which had not been carried out during the present tenancy. One of the main underground carriers, at the date of my visit, was blocked, and as a consequence the sewage was being turned on to a limited area of a grass field, at which spot the land was apparently sewage-logged.

Of sewage treatment proper there appeared no sign.

The privy midden is in general use. The middens are of excessive size, sunk, often deeply, below the ground level, and many of them are uncovered. They are mostly found in a wet and offensive condition. . . . Until November of last year the scavenging of middens was left entirely to the householders. In that month, however, as a con-

sequence apparently of the remonstrances which had at different times been addressed to them by the Board, and of the visits of the Medical Officer to the County Council, the sanitary authority entered into contracts with four separate contractors for the scavenging of the four different wards in the district. The contracts, which were made for the period of one year, require the contractors to remove all night-soil and ashpit and house refuse in accordance with the provisions of the by-laws. The contracts have certainly not been acted up to in this respect, for the by-laws require the cleansing of every ashpit and every privy "at least once in every week." So far from this having been achieved, large accumulations of ashes were in some instances found, which had never yet been visited by the scavenger, and many middens, although said to have been emptied once or more under contract, were quite full at the time of my visit. The scavenging of the district must, therefore, still be regarded as unsatisfactory. . . .

The by-laws themselves are similar to those of the Model Series issued by the Board. But in several important respects they have not been enforced. This is notably the case with regard to the construction of new privies, ashpits, and cesspools. Such ashpits as were visited which had been recently constructed in connexion with new houses, were found mostly of excessive size, not rendered inside with cement, or asphalted, nor were the floors raised three inches above the level of the surrounding ground, as required by clause 34 of the by-laws.

Defects of a similar character to those above mentioned were found as regards new ashpits and cesspools elsewhere, and seemingly no attempt had been made to enforce the by-laws in these important particulars.

As a result of my inspection, the conclusion seems unavoidable that, with respect to the provision of sufficient sewers for their district, the provision of wholesome water supplies, and the enforcement of by-laws, the Brownhills Urban Sanitary Authority have failed in the discharge of the duties imposed upon them by the Public Health Act, 1875.

IN his report on the Sanitary Condition of Kensington for the four weeks from May 22 to June 18, Dr. Orme Dudfield again comments strongly on the anomaly by which the Water Companies have power to cut off water and thereby create a "nuisance" to be dealt with summarily, while the Sanitary Authority is bound to issue a notice for the abatement of the nuisance, and thus becomes, in fact, the agent of the Water Company to secure payment. The position thus created is, as Dr. Dudfield says, both ridiculous and undignified. The Water Companies ought to be given other powers for recovering their rates, and the power to cut off water removed.

AMONG the vases,—a small but very valuable collection,—recently acquired for the British Museum, there is one, a white Athenian cylix by Sotades, which from its rare subject calls for special attention. On it is represented the myth of the imprisonment of the Sear Polydeides in the tomb of Glaukos, son of Minos. So far as we know there is only one other supposed instance of this curious and obscure bit of mythology, and that is on a lekythos also of the white Athenian kind, quite recently published in the *Jahrbuch* of the German Archaeological Institute. In that case the representation consists of a large white tomb-mound, from which branch out conventionalised trees. Two huge snakes dart from the tomb apparently to attack an approaching male figure who is supposed to be Polydeides. Perched on a branch across the tomb-mound is a small owl done in purple. It was an owl which, according to Hyginus, discovered to Polydeides the burial-place of Glaukos (*vidit nocturnam super cellam vinarium sedentem*). The story of Glaukos and Polydeides is but little known, and the acquisition of this cylix by the museum will, we fancy, send many people seeking to their mythological dictionaries. We may note as a point of interest that these two vases in which alone the myth occurs both belong to a distinctively Athenian class of work. As to the rest of the collection, there is a second Sotades cylix, in which a maiden is represented plucking fruit from a tree; on a third cylix, so similar in style that, presumably, it is from the same hand, a man armed with a club confronts a grey serpent. Now that these three white cylixes

are added to its collection, a collection which included, he remembered, the Pandora vase and the Aphrodite on the swan, the British Museum stands, for this department, easily first among the museums of Europe. Three red-figured cylixes deserve mention; one signed by Hermaios, the other two respectively in the styles of Euphronios and Chachrylion.

THE Society for Preserving the Memorials of the Dead have, as we understand, undertaken to repair the Belaysse monument, against the east wall of St. Giles's-in-the-Fields Church. It commemorates the Royalist John, son of Thomas, first Viscount Fauconberg, created Baron Belaysse, of Worlaby, county Lincoln, on January 27, 1644, his three wives, and several of his children. A long inscription, much worn, recounts his services to Kings Charles I., Charles II., and James II. His third wife, Lady Anne Paulet, was daughter to John, fifth Marquis of Winchester, who so long defended Basing House in the Civil War. Lord Belaysse died on September 10, 1689; his second wife was buried, in 1662, beneath the altar-table in the former church, and re-interred, in the new churchyard, in a vault under the north gate.* In No. 1369 of the *London Evening Post*, for August 24-6, 1736, we read:—

"Last Week was finished a very lofty and costly Monument of most curious Workmanship, and affixed to the East Wall of the Church, in the Church-yard of St. Giles's-in-the-Fields, Middlesex, on part of which being of White Marble, in black Letters, under a Coat of Arms, impaled, of Belaysse and Powlet, is the following Inscription

A drawing of this, which was set up by Lord Belaysse's two surviving daughters; with a copy of the inscription saying it was erected in 1736, is contained in the *Gentleman's Magazine* for August, 1817. The shield (its charge, and the coronet above, almost effaced) is carried on a high wall-slab, in front of which is a sarcophagus supported by two feet upon a high base, and finished at the top with a pediment. Now it is worthy of notice that Hatton, in his "New View of London" (1708), describes a monument as then within the chancel of old St. Giles's (built 1623, and pulled down 1730) thus:—

... a black and white Marble Monument, with Columns and Entablature, of the Ionick Order. And these Arms: A Chevron betw 3 Flowers de lis, with a Crescent for a difference [Belaysse] impaled with 3 Swords in pile [Paulet]. Also these Arms [since removed]: A Fess betw 3 Cross Crosslets. And this Inscription, This Monument was erected, Anno 1670 [sic], in memory of the Honourable John, Lord Belaysse, Baron Worlaby, second Son of Thomas Lord Viscount Fauconberg, his Wives and Children.

Hatton gives, but not quite accurately, all the inscription; Maitland, 1757, faithfully copies Hatton. John Parton's book, 1822, upon the hospital and parish of St. Giles, rehearses Hatton's words, adding, in a note, "this monument is still remaining, and is on the outside of the church, against the east wall of the chancel." Parton cites "1670" as the date of Lord Belaysse's interment; and does not point out that the memorial we refer to differs from that described by Hatton, save as to its upper shield and lettering. And whilst we do not find in some of the later books upon London any mention of a Belaysse monument here, the earlier chroniclers say nothing to indicate—except by the comparison we make above—that, as seems to be the case, a former memorial was altered to, or replaced by, the one of 1736.

A SMALL exhibition of wood-carving is now being held at 33, Brewer-street, W., and consists of the work done by the pupils of the Donegal School of Wood-carving, which was first started in 1888 in Gweedore, under the direction chiefly of Mrs. Ernest Hart. There are several excellent specimens

* In 1673 he lived in Charles-street, St. James's-square. His nephew, Thomas, second Lord Fauconberg, married Cromwell's daughter, Mary; they lived in Soho-square. See our "Note" of May 16, 1891.

of work,— some panels, a cabinet, and smaller objects, such as bellows, boxes, &c., the carving being conventional, and taken largely from Renaissance models. Some few things have more of the Irish character in their detail, and doubtless when the school has been in existence some little time longer more attempt will be made towards originality of design. Meanwhile, the object is a praiseworthy one, and deserves support, as supplying an employment for a large population in the congested districts of Donegal during the winter months.

THE advertisement for a new chapel for Gray's Inn, which appears in our advertising columns this week, adds another to the collection of amusing documents of this kind which might be made. Architects are invited to send in plans to 3-in. scale—a very large scale for competition drawings, putting unnecessary extra labour on the competitors; no payment or premium of any kind will be made save in respect of the design which shall be accepted, and apparently the promoters of the competition do not hind themselves to accept any design, though they do not seem to know how to express this, as they put it in these words—"who will not be bound to accept the lowest or any estimate;" apparently confounding an architectural competition with the sending in of tenders by contractors, and applying to the former the safe-guarding phrase generally used in the latter case! Of course if people send in competition advertisements of this absurd kind, the publisher of this journal has no choice but to accept the order as sent; but we would really suggest to some of those who are about to advertise competitions that they might find it worth while, before sending their order to the publisher of the *Builder*, to consult the editor as to the form of their advertisement. Some at all events of those who have competitions to advertise might in that case have saved themselves from appearing ridiculous in print, and from wasting their money in advertising competitions on terms which no high-class architect would look at.

LETTER FROM PARIS.

THE Salon des Champs Elysees has closed its doors and the formal distribution of prizes has served as occasion for many conciliatory speeches; M. Bonnat in the first instance and after him the Minister of Fine Arts, made eloquent appeals in favour of artistic brotherhood, and similar sentiments were expressed at the annual banquet the same evening, and the guests separated full of agreeable illusions which are not very likely to be fulfilled. There is in fact a great gulf between the two camps, and the new Salon, in suppressing awards, which prove very little and often cause discontent, has collected around it many artists, injustice to whom seemed to have become almost a principle of action. On the other hand there is reason in the poet's line—

"Tel brille au second rang qui s'efface au premier";

and many painters and sculptors have gained by the schism an official position which they could not otherwise have commanded. To bring about the union talked of would need a thorough revision of the procedure of the old Salon, and a great deal of giving way on the part of stiff-necked members of the Institut; and on the whole it seems probable that M. Bonnat and M. Pavis de Chavannes will resign over their respective territories for another year at all events.

The date for the next Universal Exhibition is already being canvassed among our political leaders. Every one seems agreed that it should coincide with the opening of the new century, and should be held in May, 1900. A decree to this effect has just been submitted to the Chamber of Deputies, which will shortly take it into formal consideration. To those who think the action premature it is replied that the decree for the 1889 exhibition was passed in 1884, and that the time between now and 1900 is not too large for the preparation that will be required, especially if it is decided to abandon the Champ de Mars for some other site.

An interesting exhibition was held last month at the Georges Petit Gallery under the title "Cent Chefs-d'Œuvres," the receipts to be devoted to the erection of ateliers for women. There were in reality about 150 pictures of the French, English, Belgian, and Dutch schools. Among the French artists represented were Watteau, Corot, Meissonier, Danbyng, Millet, Troyon, Dupré, Courbet, and Manet. The English pictures formed a very interesting collection, and served to show how much some of our painters, as Dupré and Rousseau, owe to the study of Constable and Bonington.

The Ecole des Beaux-Arts has just exhibited the "envois de Rome," whereof the architectural drawings only are of much interest. In painting, the "Christ" of M. Dangor, a fourth-year pupil, would pass unnoticed in any average exhibition, and in sculpture M. Boutry's "Le Paix" is but a commonplace composition. But among the architectural groups we find things really worth attention. We may especially note the restoration of the Temple at Epidauros, by M. Deffrasse, a fourth-year pupil, which is a most remarkable work and full of learned detail. M. Tournaire's study of the Temple of Juno at Agrigento is also worth notice, and his restoration of the *apartment* from one of the Florentine palaces. M. Sortais has sent drawings of the Thermæ of Agrippa, and M. Pontremoli drawings of the Forum of Nerva. The one criticism to be made is that all these are purely academic drawings showing only correctness, knowledge, and labour, but no original conception.

As has been mentioned, Madame Léon Bertaux, founder and president of the "Union des Femmes Peintres et Sculpteurs," is a candidate for the chair in the Académie des Beaux-Arts left vacant by the death of Bonassieux. It is understood that the Academicians intend to dispute every attempt to break through the rule against the entry of women into their ranks; the candidature of Madame Bertaux, however, is not in one sense without precedent, as several women were accepted as members of the "Académie Royale de Peinture et de Sculpture" in past days. The first was Catherine Duchemin, wife of Girardon the sculptor, and the last Madame Vigée-Lebrun. In 1793, the "Académie Royale" was suppressed, and at the formation of the Institut women were formally excluded.

At the Hôtel de Ville the placing of the decorative paintings in their positions is going on; in a few days M. Benjamin Constant's ceiling will be *marouflé*, and those of MM. Morot and Gabriel Ferrier, and those of MM. Pavis de Chavannes. The "Galerie des Paysages" is nearly completed, and M. Burrias has just finished his cupolas. M. Binet is at the present moment occupied in painting, also for the Hôtel de Ville, an immense composition illustrating the voluntary enlistment during the siege of Paris in 1870, on the Place du Panthéon.

The visits made by the members of the Congress of Architects last month were the occasion of drawing special attention to some buildings of considerable interest, and we cannot do better than devote the remainder of this letter to some notes of these visits and the buildings which formed the object of them.

The first visit made was on Monday the 20th, to the Musée Galliera. In 1878 M^{me}. Marie de Brignole, widow of Raphael de Ferrari, duc de Galliera, presented to the City of Paris the 9,800 mètres of ground on which M. Gluzin has built this museum, which surrounds a beautiful square, full of flowers and verdure and ornamented with a fountain. The generous donor has added to this gift a sum of 6,500,000 francs, of which 4,560,000 have already been swallowed up by the buildings. The works, begun in 1879, and delayed owing to the necessity of having to make elaborate and careful foundations in the old quarries of Chaillot, will intend to turn it into a thoroughly modern museum, something in the style of that at the Luxembourg, and to collect there the principal works in painting and sculpture obtained from the public to architectural designs; there will perhaps be some interest aroused in the models in relief, and the framework designs which formed a feature in the exhibitions of the City of Paris in 1878 and 1889. The Musée Galliera is a pretty "honnêteté," designed in an entirely Greek style, by an architect who thoroughly understands his work. It is entered by a semi-circular court, the porticoes of which communicate with the colonnades opening on to the

gardens on each side of the central pavilion. This pavilion has been decorated by MM. Chapu, Thomas, and Cayrol, with symbolical statues of painting, sculpture, and architecture. In the vestibule the bust of the founder will be placed; then there is a Salle de Peinture, lighted from above, and flanked by smaller rooms, which leads to a sculpture gallery, well lighted by three large bay windows looking on to the Square. The *façade* of the building is 74 mètres long. There is a small library, several other rooms, and some large shops on the ground floor.

The Congress then proceeded to the Trocadéro Palace, where, instead of going to the Sculpture Museum, they were detained in the Salle des Fêtes by the interesting description given by M. Bourdais, who is a distinguished engineer and architect. He explained the construction of this great hall, which has a height of 35 mètres and a width of 50. He announced, to the surprise of every one, that the stage, which measures 30 mètres at the opening, is exactly double the size of that at the Opera. He also tried to justify the acoustic properties, which have been found notoriously defective, by affirming that the most delicate tones of the violins in the "Minnet de Boccherini" were heard in every part. Without following M. Bourdais in his scientific dissertations, we may mention here the regrettable oversight with regard to M. Daydon, who was collaborator with M. Bourdais, and whose name (unless we are mistaken) was never mentioned. We will, however, now pass on to the Musée de Sculpture Comparée, which extends the whole length of the gallery on the right of the Palace. M. Geoffroy de Chaume has collected here with much taste, the finest specimens of the Roman epoch, of Flamboyant architecture, and of the style of the seventeenth century. To the contents of this gallery a long article was devoted in the *Builder* of August 10, 1889.

The next day, at the same time, the Congress assembled at the other end of Paris, in the "Bourse du Travail," which has recently been inaugurated under the name of the "Carmagnole" and which is the last socialistic concession made by the municipality to the working syndicates of Paris. It is the popular tribunal, open to the everlasting claims against the "Infamous Capital." It is also the spot from whence the middle man is to be evicted, and in a word it is to supersede the "Bureau de Placement." In confiding this building to M. Bouvard, the Municipal Council made a happy choice, for few architects possess in a similar degree the qualities of administration and organisation necessary for the accomplishment of such a work. The spot chosen was at one time occupied by a panorama, near the Place de la République, in a popular quarter, and two steps from Belleville, which has been called the "Mont Aventin de la Révolution." It was necessary for the purpose to have a large building, solid, cheap, well designed and ventilated, and of a simple and severe style. All this has been very well carried out by M. Bouvard. On the ground floor is a hall for the engaging of the workmen; above is a large hall for public meetings, with oak panelling, on which the arms of the old corporations are carved. In the semicircle occupied by the Tribune are painted the principal Parisian trades. All this decoration is unpretending, and in good taste; the artist is M. Delmotte. Ventilation is effected by inlets under the benches, and heated air is admitted. The whole building is lighted by electricity. On the first stage are all the numerous offices for the working syndicates, who have also a general hall and a library. All these rooms are well-lighted and furnished in a simple and comfortable style, which does credit to M. Bouvard's taste, and which met with the approval of the Congress. The visit to the Conservatoire des Arts et Métiers was next made under the direction of M. Ancelet, to whom the Government has confided the erection of the new galleries at the extreme end of the garden, which itself will be converted into a great hall to receive the machines which are actually on view in the old Church of St. Martin des Champs. These galleries were begun in 1886, and then left for some time. The cost has already mounted up to 500,000 fr. Early on Thursday morning the Congress started for Châlons, where they were met by the Architectural Society of the Marne, and conducted by M. Génouys, diocesan architect, to the Cathedral of St. Etienne. It dates from the end of the



Accepted Design for Cemetery Chapel, Ripon.—Messrs. Clark & Hutchinson, Architects.

thirteenth century, and possesses a very beautiful nave. The choir is surrounded by apsidal chapels, which from the outside give a very beautiful effect. We noticed a bas-relief of the sixteenth century, and several tombstones of the fourteenth century, and an altar made in 1686 from the designs of Mansart. The Congress lunched in a picturesque restaurant having the quaint name of "Hôtel Haute Méridien."

After a visit to the church of St. Alpin, decorated with stained glass of the Renaissance period, and with a painting on a gold background assigned to Van Eyck, the Congress proceeded to the church of Notre Dame de l'Épine, at some distance, and which was really the principal object of the excursion. This is a fine specimen of the Florid Gothic of the second half of the fifteenth century; it includes a long nave and side-aisles with large windows, a choir surrounded by a cloister, and a Renaissance organ-case. The church, which almost rises out of the fields, has two large towers, one 46 mètres high. Châlons has several other curious monuments, and these occupied the remainder of the day.—the churches of Notre Dame, a very complete specimen of the Roman style, St. Loup and St. Jean, the Palais de Justice (M. Collin, architect), the Seminary, the walls of which date from the time of Louis XIII., and finally the old residence of the Governors of Champagne, which dates from the eighteenth century, and is one of the most beautiful Hôtels de Préfecture in France. It is a very large building, and contains nine fine salons en suite, opening on to a beautiful walk called the "Jard" in which the walks are almost lost to view as they disappear under the old trees. We may mention the Hôtel de Ville, which also dates from the eighteenth century, and not far from it is the Museum. The last day of the Congress was given up to a visit to the new buildings of the Court of Appeal. M. Daumet was the guide, and showed first the civil Tribunal room, which is installed in the "Grand Chambre" of the Parliament, executed and ornamented under Louis XII. by Fra Giovanni Giocondo, and of which the fine ceiling has been entirely preserved. The "prétoire" is decorated with a fine tryp-

tych representing the Christ accompanied by symbolical figures, an exquisite work of Elie Delannay's, framed in a wooden setting of which all the details were designed by M. Duc. This was the last effort of the great architect, who never lived to see the accomplishment of his work. All this time M. Daumet never ceased to give all respect and praise to his predecessor's taste and talent, whose work has remained one of the most beautiful monuments of the century.

The first room of the Court of Appeal is the personal design of M. Daumet. The ceiling of natural pine is decorated with panels with cornucopias and other devices carved in the wood and painted by M. Guiffard. In the centre a space is reserved for a composition by M. Bonnat. The walls are hung with a light blue stuff, ornamented with arabesque, and bordered with Aubusson tapestry. The sculptured ornaments are by M. Flandrin, and above the "prétoire" is the celebrated picture of which the *Builder* has already spoken, and which is one of the gems of the Palais de Justice. This picture, painted about 1452 to 1455, was in the "Grand Chambre du Parlement," and it has been attributed both to Van Eyck and to Albert Dürer. The details and some of the execution, however, seem to point to its having been painted by a French artist. The doors of the prétoire are surmounted by bas-relief in wood, gilded and decorated with the Royal Arms. These have been for some time hidden, and the architect bringing them to light urged their being used in spite of their Monarchical character. After passing through a "Salle de Conférence," and the office of the President, the second room of the Court of Appeal was reached, and from there the Congress was conducted into the new "Grand Chambre," which was inaugurated on April 6. It was commenced by M. Duc, and was the last work of M. Coquart. Perhaps rather too rich and heavy in its magnificence, still this great room forms a fitting setting for the supreme tribunal of France. At the end is a Christ of M. Henner's. The ceiling is ornamented with a great composition of M. Bandy's, "The Glorification of the Law." Some very original ornamentations fill in the windows of the great halls which light the room, the

carving being done by M. Cugnot, and the painting of the ornaments by M. Chauvin. This is the work to which M. Coquart has joined his name, and which ended the series of Congress visits.

CEMETERY CHAPEL, RIPON.

The illustration shows the design for the proposed new cemetery chapel for the Corporation of Ripon, which was selected in competition. Messrs. Clark & Hutchinson are the architects.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

WE continue Mr. Ashby's statement as to the pollution of the Thames between the intakes of the water companies and Oxford:—

The Colne.—The population of the valley increased about 31 per cent. during the thirty years 1861 to 1891, and will probably have increased about 46 per cent. during the forty years ending in 1901. That the Colne and its branches receive much sewage and other pollution will be apparent from a perusal of the details. This river and the Grand Junction Canal above Cowley are intimately connected,—in fact, they form one stream, since much of the canal water flowing southwards between the summit near Tring and Cowley Lock, below Uxbridge, is discharged into the river, some by means of overflows, the rest at Cowley Lock, which empties into it. It is true that some of the Colne water is conveyed into the Thames below the intakes of the London water companies through the artificial cuts known as the Duke's and King's rivers, but a very large proportion of it reaches the Thames above the intakes by its branches which pass on to the Hythe end at Wraysbury and to Staines; the latter branch, as previously described, contributing two small streams which receive further pollution, and join nearer the water intakes. There is a large floating population on the canal which may add greatly to the

* See last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, p. 10.

pollution of its water, whilst the bilge-water of canal boats carrying offensive cargoes must necessarily be pumped into it. Enormous quantities of asphalt and other filthy refuse are barged from London, chiefly from Paddington, and are deposited along the Slough branch of the canal, whereby festering heaps of a most highly-offensive nature are accumulated on its banks, and, in some instances, close to the Colne. At the public wharf on the Slough branch of the Grand Junction Canal at Langley Marsh, there were the remains of a large deposit of house refuse. Passing eastwards along that canal branch, I observed some leakage from it into a small branch of the Colne, which it crosses; and in that stream there was much foul deposit. At the next public wharf on the north side there was an immense deposit of strong manure and asphalt refuse right on the edge of the canal, and draining into it. Further on there was a large deposit of manure immediately over a land drain which was running into the canal, just opposite, on the south side. Much manure had evidently been recently deposited. On the north side there was another large lot of town refuse falling into the canal. At a brickfield on the same side there was a landing-place for ashes overhanging the water. I then saw a large deposit of refuse, and also at another brickfield there was a large canal boat, with open sideboards, piled up with house refuse, being unloaded on to the bank. On the south side, a large heap of manure was draining into the canal. On the same side, beyond the iron bridge crossing to Iver, there was a high heap of house refuse on the bank, and close to the edge of the western division of the Colne, into which it fell and drained. It was about 45 yards long, 7 yards wide, and 5 yards high. The stench emitted from it was unbearable. Near to it there was a large heap of old tins, thirty-eight or forty loads or more, showing that the place is much used for a refuse tip. Here there were human excreta lying close to the edge of the Colne, that evidently being a place much resorted to. There was some leakage into the Colne from the iron trough, which carries the canal across the river; and much mud was deposited on the bed of the latter. About 50 yards further on, and on the north side of the canal, was an enormous tip of putrid refuse, about 170 yards long, 10 yards wide, and 5 yards high; refuse being level with and strewn about close to the water-edge. Although on the other side of the canal, I was forced to run past this mass of putridity, as the stench arising from it was overpowering. A stream coming from the direction of Iver skirted the east end of the base of this filthy heap, joining the next division of the Colne about 150 yards further to the east. The refuse was falling and draining into this stream, and made it in a very foul condition. In the Colne at that part there was much mud, and there was some oozing into it from the iron trough carrying the canal over it, as well as some direct leakage from the canal into it. Here also human excreta were deposited close to the water-edge. There was very considerable leakage into the next division of the Colne from the canal, where it is carried across it by a bridge. On the public wharf by the iron bridge crossing the canal and leading towards Uxbridge, there was another large tip of house-refuse falling into the water. Near Fray's river I saw two heaps of foul matter, said to consist of street-gully and sewer-cleanings, &c., which had been brought from Paddington, and I saw a canal-boat full of this filth being unloaded there. Some of the low-lying land immediately adjacent to the several divisions of the Colne is manured with these foul matters. The water in this branch of the canal is almost stagnant, and along it there was abundant evidence of the contamination it is constantly receiving from foul cargoes and refuse heaps. I also observed several dead animals floating in it.

I have dwelt thus fully upon what I observed at this part, because the matter assumes importance when we consider that there is constantly some leakage of the impure canal water into the Colne, and that at times this assumes considerable dimensions.

Uxbridge is sewered, and the sewage, after being very imperfectly treated with chemicals, is discharged into the eastern division of the Colne, a little above the Slough canal. The sewage is delivered under water; it made the river very turbid, and I found it highly offensive, even after mixture with the river water. In Uxbridge I found a little sloop and privy

pollution going directly into the river, and also much pollution from a fellmonger's yard. There is a pollution at the following places on the Misbourne:—At Chalfont St. Peter's I found much sloop pollution and a great deal of blood discharged into the stream opposite a butcher's shop. At Chalfont St. Giles there is a good deal of sloop pollution. At Amersham the pollution is very gross. I found the bed of the river in the filthiest state, there being an enormous deposit of sewage matter upon it. This disgraceful state of things is caused by the discharge of street sewers, house drains, and privies into the river. I counted about forty of the latter discharging directly into it. A brewery drains into it, and I observed some pigsties similarly circumstanced. There are also several drinking-places which afford opportunity for pollution from cattle, of which I saw not less than seventy-five head grazing on land adjoining the river. At Rickmansworth, on the Colne, there is much pollution. Many privies are built on the edge of the river, as though they previously discharged into it; but I could not see any doing so now, those I entered appearing to have fixed receptacles fitted to them; they are, however, in close proximity to the streams. I observed many sewers and drains discharging much sloop pollution into the river and canal. I also saw some cattle and brewery pollution, and a tannery appeared to drain into the stream. Below a large mill, formerly used as a paper-mill, but now as a print mill, the Colne water was very turbid, and its surface was covered with white foam. I found much pollution of the river Gade at Hemel Hempstead, where I observed sewers discharging filth into it; there was a large deposit of sewage matter on the bed of the stream. The sewage from the higher part of the place passes through a covered tank, which has an overflow into a ditch below, under the canal to join the river below the paper-mill at Two Waters. This ditch was in a foul condition; it appeared also to receive drainage from a tannery. At Berkhamstead, on the Balbourne, there is excessive pollution, but I understand that steps are being taken to lessen it. Here I observed house drains and privies discharging freely into the river, which at its junction with the Grand Junction Canal was in a filthy condition, its water being black and stinking, and below that spot it receives still further pollution. Below the junction of this stream the character of the canal water was entirely changed; higher up it was muddy and yellow, but there it was most filthy, black and opaque; gas was bubbling up freely from it, human feces floating on its surface, and passing barges stirring up black sludge in it. I saw a sewer and privy discharging into the canal. Watford, on the Colne, is sewered. This place contributes much pollution to the river. The sewage, after some precipitation, is passed on to under-drained land. By the sewage-farm I found much filth in a ditch into which three storm-water overflows discharge. The Wye or London River rises a little above West Wycombe. It passes nine flour mills, fifteen paper mills, one fellmonger's yard, and one brewery, exclusive of any of the latter at High Wycombe. The manufacture of paper is largely carried on in this valley, and in the neighbourhood of the numerous mills houses are freely scattered along its sides. The river in its course receives a little sloop pollution, some cattle pollution, the effluent from a sewerage-farm at High Wycombe, pollution from a fellmonger's yard, drainage from a brewery, and much manufacturing pollution from the numerous paper-mills, from several of which I saw foul liquid discharging into it; the final result being that, on reaching the Thames at Bourne End, it was in a very foul state.

The Thames.—This stream and its tributaries may be described as much polluted. On the Thames I found much pollution at Dorchester (as already explained). At Drayton there was much sloop pollution. Wheatley, a Local Board district, is a large, compactly-built village, consisting mainly of two parallel streets. There are road sewers, into which house-slopes are drained. A covered brook, in which there are several sewer ventilators, flows through the lower street, and discharges into a running ditch, which I found very foul from sewage deposit. Thame, with a population of 3,000 in 1891, contributes much pollution. There are several outfalls; at one I found a filthy sewage deposit, close to the Cattle Brook. Slops are discharged into pitched gutters, some of which

end in street sewers. At Caddington I found much filthy deposit in a ditch, delivering into the Dad Brook below two large houses and a farm-yard. In the main part of the village there are road-sewers into which slops are thrown. They deliver into a running ditch which joins the Thame. On the Aylesbury branch there was much pollution at Aylesbury, which contained 8,674 inhabitants at the census of 1891. This place is sewered, the sewage being treated with chemicals. I found the sewage effluent as it was discharged into the stream, turbid, discoloured, and highly offensive. I also observed six drains discharging sloop-pollution directly into the stream.

The Ock.—Rising not far from Uffington, joining the Thames at Abingdon, I found much pollution of this river and its branches. Wantage, with a population of 3,669 in 1891, contributes much sewage pollution. I observed several sewers discharging into the stream, so much so that it was in a very foul state even as far as Grove, about two miles lower down.

Sutton Courtney Mill Brook.—At East Hendred there was much sewage pollution. I found a sanitary pipe-sewer ending in a ditch in which there was an enormous deposit of highly-offensive filth. The village school also drains into that ditch. At the ford below Ardington there is a sheep-washing place, just below which I observed a sanitary pipe-sewer discharging offensive fluid into the stream, in which there was much foul deposit. Blood issues from this sewer at times.

The Moor Ditch.—This small stream is much polluted, firstly at Long Wittenham, then at Didcot and Didcot New Town, where I found filthy deposits from sewer outfalls in ditches joining the branch from that place, and lastly at Harwell, where I found the stream very dirty from sloop and cattle pollution.

The Kennet.—The effluent from Reading Sewage Farm enters the Kennet before it joins the Thames. There is a separate system of surface-water sewers in that town, and it is impossible to prevent a certain amount of sloop pollution through them. Newbury is partly sewered, and partly drained into non-water-tight cesspools, which are affected by the water level, water standing in them to within a very few feet of the surface. Sewage is discharged into the canal by various outfalls, whilst a fellmonger's yard, numerous house-drains, soil-pipes, and privies also discharge into it, a public privy and urinal belonging to the Corporation being amongst the number. Probably not less than half the water-closet sewage and two-thirds of the sloop-drainage reaches the canal, which was in a filthy state. I found the river at Marlborough in a very filthy state from sewage pollution, there being a large deposit of sewage in it. With the exception of some earth-closets in a few houses, the whole of the sewage is discharged into it by various outfalls which I saw. Marlborough College, with its laundry for about 600 boys, besides masters and servants, is drained into it. I also observed drainage from a tannery, and a little cattle pollution.

The Loddon, Whitewater, and Blackwater.—Sewage is treated at Wokingham, Wellington College, Royal Military and Staff Colleges, Broadmoor Lunatic Asylum, York Town and Camberley, Aldershot Camps and Barracks, Aldershot Town, and Basingstoke. There is considerable pollution of the Blackwater at several places. There are arrangements for treating the sewage from Wellington College by chemicals and on under-drained land. At the time of my visit, I think it was being put directly on to the land, and there was much pollution of a stream running into the Blackwater, and the stream contained much sewage fungus. I believe, however, that improved works are being carried out there. The sewage from Broadmoor Criminal Lunatic Asylum, where there are some 700 persons, is treated on land. I did not observe any under-drains, but saw some natural drainage from the irrigated land, apparently in good condition, which is discharged into a stream joining the river. Here there are about forty cottages, and near some of them there was a drain-pipe delivering much foul sludge into a ditch which joins the commencement of the above-named streamlet. Sewage from Sandhurst Royal Military College and from the Royal Staff College is treated on land past which a running ditch flows into the river. I found a large deposit of offensive black sludge in this ditch. I also observed foul sludge in a cutting through an osier bed which appeared calculated to take sewage, as

also on the bed of the river, where it is joined by this. York Town and Camberley are sewerd. The sewage from the higher parts passes through a small intercepting tank, and from the lower parts it goes through another. It is then all treated on some under-drained land, the effluent being discharged into a stream which flows into the river. I saw sewage running off the surface of the land into the stream. There are road sewers at Farnborough-street, and I saw an outfall sewer discharging into a ditch full of foul sludge, which joins the Blackwater a short distance off. The sewage of the North and South Camps and Barracks at Aldershot is treated on a farm at "Aldershot Stubbs." The greater portion of the land is under-drained. The lower part of it abutting on the Blackwater is very swampy. There are various channels which contained much sludge by which effluent from the surface flows into the river, in which there was also deposit of sludge. A ditch passing through a part of the farm into the river also contained much sludge. The town of Aldershot is sewerd, the sewage being treated separately from that of the camps. It is conveyed to a piece of land abutting on the Blackwater by the "County Bridge," where it is first lifted into tanks in which it is treated with chemicals, and is then run over some under-drained osier beds. I found the effluent very indifferent. It had a bad odour, and about half a mile lower down there was much foul-smelling, black sludge and sewage fungus in the river.

The Chertsey and Addlestone Bourne.—The Bourne joins the Wey near its junction with the Thames, between three and four miles above the first pumping-station. The sewage from Virginia Water Sanatorium is treated on under-drained land, the effluent being discharged into a ditch which joins the stream skirting Thorpe Green. I found much offensive black sludge in that ditch, but since that time an improvement has been effected by under-draining the sewage land at a greater depth. There are many tub-closets in Addlestone, which are systematically emptied by the Chertsey Rural Sanitary Authority. Their depot for that part, where I saw a large accumulation of night-soil, is at Ham Moor. By the side of it there was a very dirty ditch, joining a polluted stream which was in a filthy condition. This stream a little higher up passes by a laundry and some farm premises, and in a short distance flows into the Bourne. There was much sloop pollution at Chobham. One road sewer discharges into the Bourne; it is a brick barrel sewer, and I saw a great deal of foul black deposit in it at its outfall. Another road sewer in which there was also a foul deposit, delivers into a stream joining the Hale Bourne. I saw a pig-stye close to the edge of this Bourne, which must drain into it. I observed much sewage pollution of the Windle Brook at Bagshot. There are road sewers, and a stream, partly culverted, flows through the village to the brook. Premises used to drain straight into the road sewers, but the deposit and paper in the brook were objected to, so cesspools and an intercepting tank with overflows into the road, sewers and culverts have been made. I observed a filthy ditch, into which horse slops are thrown, above the "Hero of Inkerman" public-house. The stream passing through the village showed signs of pollution. I saw several places where house drainage was delivered into it. Mostly highly offensive sewage from the houses below the Bagshot Institute was being discharged into the brook, and I saw other very foul sewage discharges and much sewage fungus.

The Wey and River Wey Navigation and Basingstoke Canal.—The Wey and canal join the Thames together below Shepperton Lock, between three and four miles above the first pumping-station. Weybridge is fast increasing in the lower part called Portmoor Park. There it much sewage pollution. On the east side of Weybridge Bridge a sewer delivers into the Wey. I there saw an enormous quantity of black sludge in the river. A triaqua water-sewer in High-street receives slop-water, and, doubtless, cesspool overflows. It discharges into a ditch, in which I found a very bad sewage deposit, and which passes through Portmoor Park into the Wey. At Stoke-next-Guildford, a drain from twenty-five houses at Stoughton-terrace delivers into a hole in the ground, which overflows into a brook which was in a filthy condition, and which flows into the Wey. Some pig-sties close to its

edge must also drain into it. At Stoughton-land there are over a hundred houses parallel to and very near the Wey, which drain into cesspools affected by the river level. At Bellfields, the "Bell" public-house, with a public urinal, and six other houses drain slops by three drains into a very filthy ditch, which shortly joins the Wey. There is no complete system of sewers at Guildford, but the surface-sewers receive house-drainage and some cesspool overflows, consequently there is much pollution of the Wey from that place. It is, however, now being sewerd, but the effluent from the sewage works of the completely-sewered place will go into the river. It will not be necessary to deal with this, because a scheme for the sewerage of the borough has been sanctioned by the Local Government Board. All the house refuse from Guildford is deposited on ground sloping down to a branch of the brook. There was a large heap of very offensive refuse, and it appeared as though drainage from it might reach the brook in wet weather. Cranleigh, on a branch of the same stream, is sewerd, and there is much sewage pollution at the outfall. The sewage is treated on a small strip of land, with very stiff salsol, which is utterly unfit for the purpose. Some osiers are grown on it, but many appear to have been killed. I found the place a perfect swamp, sewage oozed into the stream in several places; the main part, however, was running off the surface in a foul, unpurified state, into the brook, which it made very turbid. I believe a system of precipitation and filtration is going to be adopted there. At Bramley I found much pollution of the stream from a sewer outfall. There is very serious pollution from a large tannery a little below the village. There appeared to be some pretence at land treatment, but I saw much highly-polluting fluid passing straight into the river, which was in a foul state below the outfall.

As already indicated, what Mr. Ashby has done for the Thames below Oxford, Dr. G. H. Fosbrooke has done for the Thames and its tributaries above Oxford, having traversed 400 miles in making his examination. A summary of the results of it we hold over, together with Dr. Frankland's scientific evidence on the effects of all the pollution on the river as a source of water supply. The Commission held two more sittings last week, and has adjourned until after the General Election.

MAGAZINES AND REVIEWS.

The Gazette des Beaux-Arts devotes again a long article to the Salons of 1892, in which M. Pottier goes a good deal into the question of polychromatic sculpture, in reference to M. Gerôme's two works. In regard to the "Bellona" which M. Pottier seems to admire much in execution, he says, "Si j'ai un reproche à lui faire, c'est de vouloir étonner. Elle trahit l'attention, mais elle frappe un peu brutalement." An article by M. Paul Lefort is devoted to the exhibition of "Cent Chefs-d'œuvre" (referred to elsewhere in our columns). The writer speaks very highly of the English School as there represented, among other things observing that our painters have always excelled the French in the portrayal of the "vraie jenna fille," and instances a portrait by Hopper. Is it perhaps because we have a more genuine kind of article to paint from? M. de Wyzena contrilutes the last of his series of enthusiastic articles on Lawrence, which is accompanied by a delicately-executed chromolithograph from a profile portrait of a young lady by Lawrence which goes far to justify all M. Wyzena's admiration. He sums up with the remark that no artist was ever more sincerely desirous to do the best, and more cruelly severe on himself. It will be odd if the French, often either jealous or ignorant of English painting, have discovered a new great master for us. But we hardly think Lawrence will be written up to the level of Reynolds and Gainsborough. The number concludes with the second article on "Le Sculpteur Copte," by M. Gayet, and contains also an article on "Le Ceramique Persane du XIII^e Siècle" by Mr. Henry Wallia; both largely illustrated.

The Art Journal starts with an article on "Art Critica of To-day" with some portraits. It might have been useful (though unpleasant) if the writer had endeavored to draw some line between those among the "persons repre-

sented" who have really a right to the name of "critic" and those who have not; in some cases at least the title "art-critic" seems to be easily earned and lightly worn. "Outings in India" (Ill.), by Mr. A. Hudson, gives some interesting illustrations of Indian scenery and buildings. Herr Van Westreheena contrilutes an illustrated article on Christoffel Bisschop and his paintings, and Mr. Claude Phillips continues his review of the French and English exhibitions of the year.

The *Magazine of Art* includes an article by Mr. Cosmo Monkhouse on "Alfred Stevens," with a portrait and some other illustrations. Mr. Spielmann contrilutes one on "Van der Straeten," the sculptor of subjects that are, as the writer of the article admits, hardly within the true range of sculpture, though clever in their own way. Professor Herkomer's second article on "Scenic Art" is the most interesting in the number, and contains a good many new suggestions, among others that of a contracting proscenium so as to give the proper proportion to a cottage room, for instance, instead of making it as large as the drawing-room of a mansion. The remarks on methods of getting effect in scene-painting show how distinctly Professor Herkomer has thought for himself in carrying out this branch of art in his own theatre.

The *Antiquary* contains an article on the "Church Piata of the County of Wilts," with various illustrations; one on the Romano British Church at Silchester, and various other matters of antiquarian interest.

The *Century* contains a very interesting illustrated paper by Dr. Waldstein on his discovery of what seems probably to be the tomb of Aristotle, and the second paper on architecture at the Chicago Exhibition, by Mr. H. Van Brunt, with illustrations of various buildings, and one of a figure of "Abundance" for the agricultural building, which rather reminds us of the French sculptor's remark in "The Wrecker," when he was told that Mr. Dodd's statue of the "Genius of Muskegon" was intended for a kind of Préfecture,—"Qu'est-ce que vous ma chantez là? Oh, in America; very good, very good." The number contains an article on Daubigny and his works, with a portrait and some reproductions from his sketch studies.

Harper's Magazine continues Mr. Millet's interesting and well-illustrated series "From the Black Forest to the Black Sea," and includes a short illustrated article on "Ancient Gold Work" by Mr. Cyril Humphreys-Davenport.

The *English Illustrated* has some notes, partly historical, on Henley and its regatta, with illustrations of Fawley Court, and an article on "Rimini" by Mme. Helen Zimmern with admirable illustrations by Signor Norberto Pazzini. Another article is on Trinity College, Dublin, with illustrations (rather slight) by Mr. Herbert Railton, and another on the Great Eastern Railway works at Stratford, by Mr. Parker, secretary to the Locomotive Superintendent. Altogether a good number.

In *Longmans' "Vernon Lee"* gives an article "in praise of old houses," suggested by a spirit of opposition to the sentiment of objection to an old house "because there seemed to be other people in it besides the living," which Vernon Lee thinks is just its recommendation. The article deals with what may be called the "historic sense" in regard to ancient buildings and scenes.

The most important article in *Scribner* is one by E. H. and E. W. Blasfield on the "Art of Ravenna," a great subject which is seriously handled and fairly well illustrated. The essential quality of the school is summed up in the expression that "while art became degraded in form it became glorious in colour."

In the *Gentleman's Magazine* Mr. Cyril D'Oyle considers how to make London smokeless,—viz., by the universal use of gas fuel. It might render London comparatively smokeless, but with the air not the less chemically impure; and what about the vast increase of gas-works necessary? Mr. D'Oyle suggests gas-making at the coal-pits' mouth, thereby saving the expense of transport of coal. There is something in that; but we do not think people will take universally to gas fuel. In the same magazine Mr. G. A. Sekon tells "the Story of the Broad Ganga." Few people know that the Great Western terminus was to have been at Eastern, conjointly with the London and North-Western. Mr. Sekon makes the shrewd suggestion that if a more energetic and enterprising company had had the broad

gauge, it never need have been taken up, and we are disposed to agree with him.

Temple Bar has also the story of "First and Last Days of the Broad Gauge," by "R. B.," who gives some extraordinary stories of the cool way of working a railway in those early days; sending out an engine on the up line to look for a late up train, to the imminent danger (sometimes only just avoided) of the two meeting in collision, &c., &c.

The *Cornhill Magazine* has a readable article on "Old Oak Chests," which recounts the process of manufacturing them with dates on and everything complete. As a test, it is suggested to prod a seemingly ancient chest with a pen-knife. If it is really old, the knife will scarcely penetrate.

All the *Year Round* contains a popular article on "Obatham and its Dockyard."

COMPETITIONS.

BISHOPSGATE FOUNDATION NEW INSTITUTE.—We are informed that the plans of Mr. C. Harrison Townsend, F.R.I.B.A., have been selected in limited competition. The cost of the new buildings, comprising a Public Library and Assembly Hall, will be 20,000.

DOUGLAS HIGHER GRADE AND TECHNICAL SCHOOLS.—We are informed that at the last meeting of the Douglas School Board, the designs of Mr. Thomas W. Cabbon, of Birkenhead, were selected in a limited competition, accommodation being provided for 300 children at a cost of about 4,000.

HOYLAKE AND WEST KIRBY LOCAL BOARD OFFICES.—On Monday evening a meeting of the General Purposes Committee of the Hoylake Local Board was held to receive the assessor's report on designs submitted for the above-named building. Mr. Cabbon has been awarded the first premium, Mr. Thomas Cook, of Liverpool, the second premium, Mr. Keefe, of Liverpool, the third, and Mr. Ware, the fourth. The cost of the new building will be about 3,000.

Illustrations.

NEW MUNICIPAL BUILDINGS, OXFORD.

WE give the perspective view and the two principal plans of the design by Mr. H. T. Hare, which has been selected in the second competition for the Oxford Municipal Buildings. We have already described and commented on the design and plan at some length in our review of the competition (see *Builder* for June 25), and pointed out the excellent character of the planning. The strength of the design lies in the plan, but the exterior shows a dignified building, and one which is suitable to Oxford, and we may on the whole look upon this as a competition with a very satisfactory result.

WARNHAM LODGE, SUSSEX.

THE drawing, now at the Royal Academy, of which we publish a reproduction, shows the garden-front of a wing erected last year, the initial object of which was to provide hachelors' rooms on the upper floor; and in order to utilise the ground floor, new kitchen and offices were provided, as shown by the plan. The facings are of local red bricks, the masonry being of Manning's Heath stone.

Messrs. Batterbury & Husley, of London, were the architects. The work was carried out by Mr. Joseph Potter, builder, of Horsham.

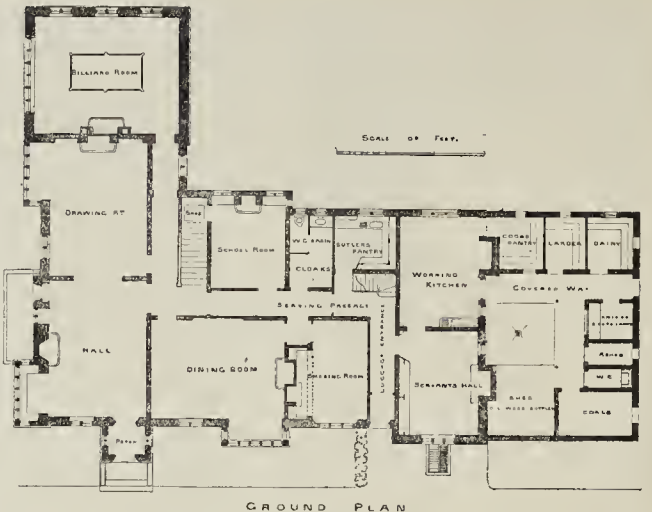
KIRKLEVINGTON GRANGE, YORKSHIRE.

THIS is the addition, in a stone district, of the principal parts of the house to an existing building, the view showing the southern or garden front. A plan is given in the corner of the plate, showing the outline of the front of the old building, and the manner in which the addition has been made.

The architect is Mr. E. J. May, and the drawing is hung in the Royal Academy Exhibition.

"FIRSDENE," BROMSGROVE.

THIS illustration is taken from a colored drawing of the house hung in the present Royal Academy Exhibition, and which indicates a



Plan of "Firsdene."—Messrs. Latman & Bateman, Architects.

Bromsgrove stone walling of ashlar face, Colley Weston slate roofing, and red-brick chimneys. Mr. Henry Lovatt, of Wolverhampton, submitted the lowest tender, amounting to 3,918*s*. The architects are Messrs. Bateman & Bateman, of Birmingham.

BARRETT-BROWNING MEMORIAL BUILDING, LEDBURY.

THIS is the perspective view and two plans of the design, by Mr. Brightwen Blyon, which has been accepted in the competition for a building to be erected at Ledbury in memory of Mrs. Barrett-Browning, who was a native of the town.

The building comprises a "Clock Tower and Institute," the main requirements we mentioned in our review of the competition in the *Builder* for May 28th. The small plan is compact and well arranged, and makes the most of the space.

STAIRCASE, TOWN-HALL, BATTERSEA.

THIS drawing shows a view of the intended staircase in this building, of which Mr. Mountford is the architect, but which is not yet commenced.

The main building will be of brick and the stone dressings of Monks Park Bath stone, which stone will also be used in the principal staircase, here shown, and which, as will be seen, shows a certain architectural affinity with the larger staircase for the Sheffield Municipal Buildings, by the same architect, illustrated in a former number of the *Builder*.

EXTENSION OF COLLEGE BUILDINGS, EDINBURGH.

ON the 23rd ult. the Governors of George Watson's College for Boys, Edinburgh, resolved, according to the *Scotsman*, to carry out various alterations at that institution. The plans for the alterations on the College, prepared by Messrs. Macaribon & Ross, Edinburgh, provide for the addition at each end of the present building of a projecting wing of three stories, with staircase towers in the angles, rising to a height of 70 ft. to 80 ft. In each story of the wings there are two rooms, measuring 30 ft. by 25 ft., having lofty ceilings, and being suitably lighted and ventilated. One of the wings will be devoted exclusively to the elementary department of the College, and the other will be utilised in the way of increasing the general efficiency of the institution, without giving accommodation to a greater number of pupils than at present. The style of architecture is in keeping with the outstanding features of the main building. The scheme of alterations further includes the construction of a large covered gymnasium in the ground at the north-west corner of the College, measuring some 70 ft. by 50 ft.; while at the north-east corner a workshop and a laboratory will be erected, each measuring about 60 ft. by 25 ft.

ARCHITECTURAL SOCIETIES.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting was held in the Rooms, 114, W. Campbell-street, on Tuesday night, the President in the chair. A paper was read by Mr. Walter Watson, on "Local Building Stones." The author described the qualities of the more important examples in use in the West of Scotland. A short discussion followed, opened by Mr. D. McKerrow. Thereafter a paper on "Cements" was read by Mr. P. V. Burke, who confined his remarks almost exclusively to Portland cement; pointing out the great variety in quality and consequent inaccuracy of tables giving the strengths, which are published, and that only by testing the actual example to be used can a satisfactory conclusion be arrived at. A lengthy discussion followed, opened by Hugh Dale.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon. Mr. John Hutton, the Vice-Chairman, presiding. Owing to the large number of members absent on electioneering business, as candidates or helpers, there was a comparatively small attendance, and only formal business was taken.

New Member.—Mr. Blake, the member elected for Central Finsbury in the place of Mr. Bowen Rowlands, was introduced and took his seat.

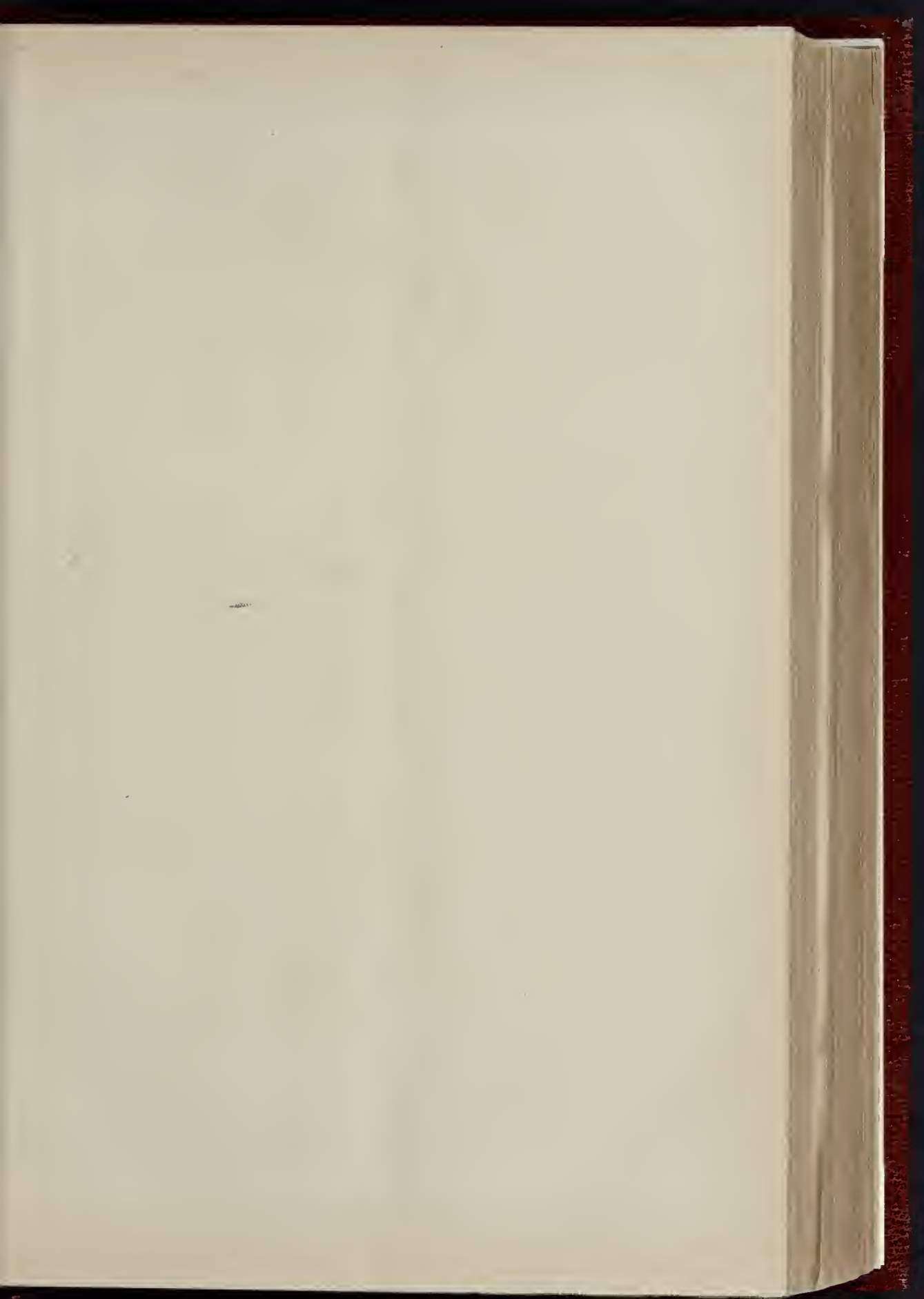
Tenders.—Tenders were received for erecting a new palm-house in Battersea Park, and for supplying 6,000 tons of lime at the sewage outfall works. The lists will be found on another page.

Rosebery-avenue.—The Improvements Committee reported that the last remaining section of Rosebery-avenue,—that between Farringdon-road and Gannall-place,—is now complete, and that the formal ceremony of declaring that important work open to the public will take place this Saturday, July 9.

Lincoln's Inn-fields.—The Parks Committee reported as follows:—

"We have under consideration the question of acquiring by compulsion the garden in the centre of Lincoln's Inn-fields for public use, Parliament having refused in the last session to pass a clause in the Council's General Powers Bill enabling a voluntary agreement to be arrived at. We are strongly of opinion that the Council should leave no step untried which might secure to the public the use of this garden, situated as it is near the densely-crowded neighbourhood of Drury-lane and Clare-market. We therefore recommend,—

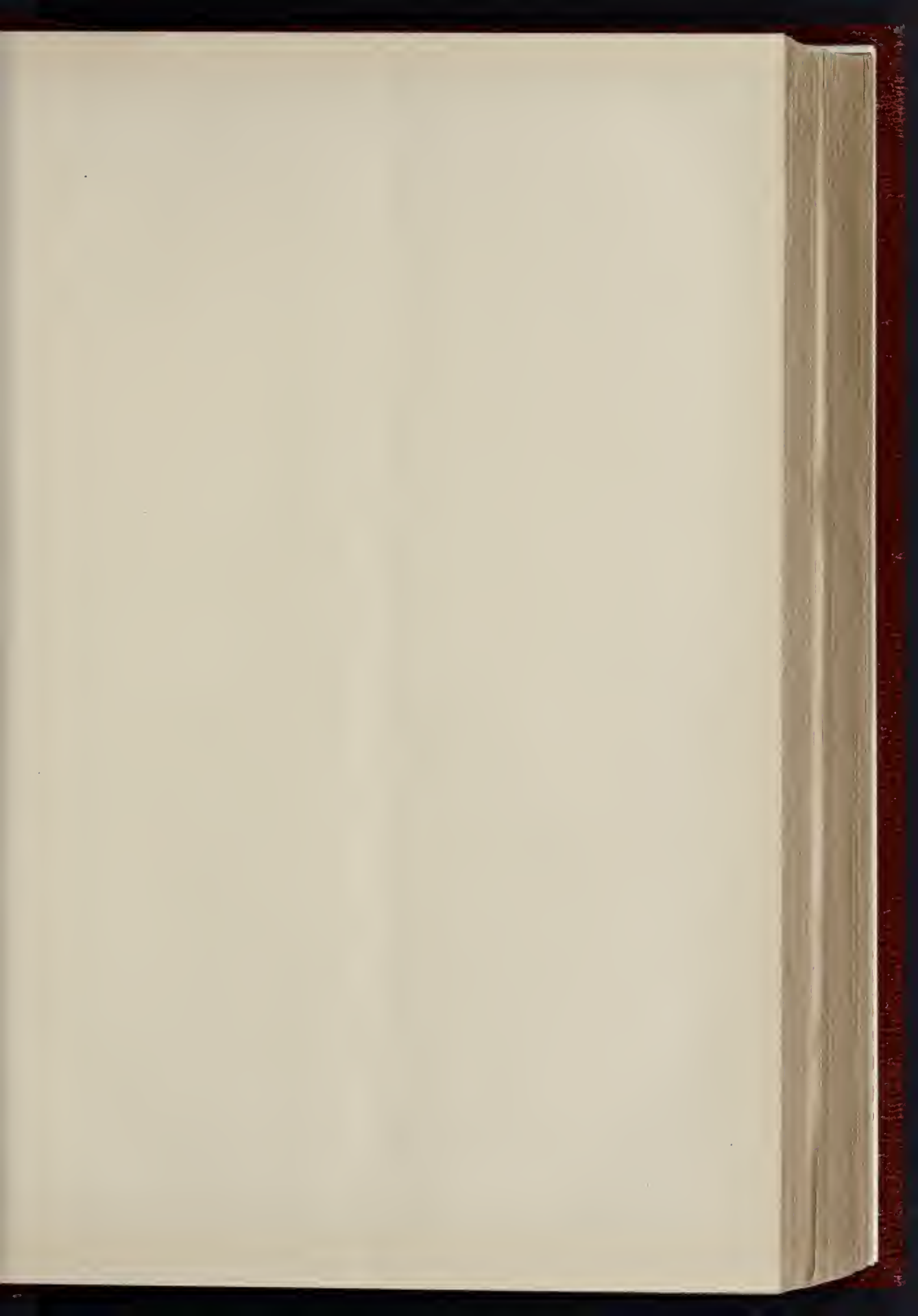
"That the Council do take steps for the opening of Lincoln's Inn-fields garden to the public, and refer it to





Royal Academy Exhibition, 1892

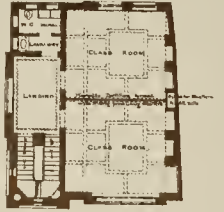






SCALE OF FEET

Ground Plan.



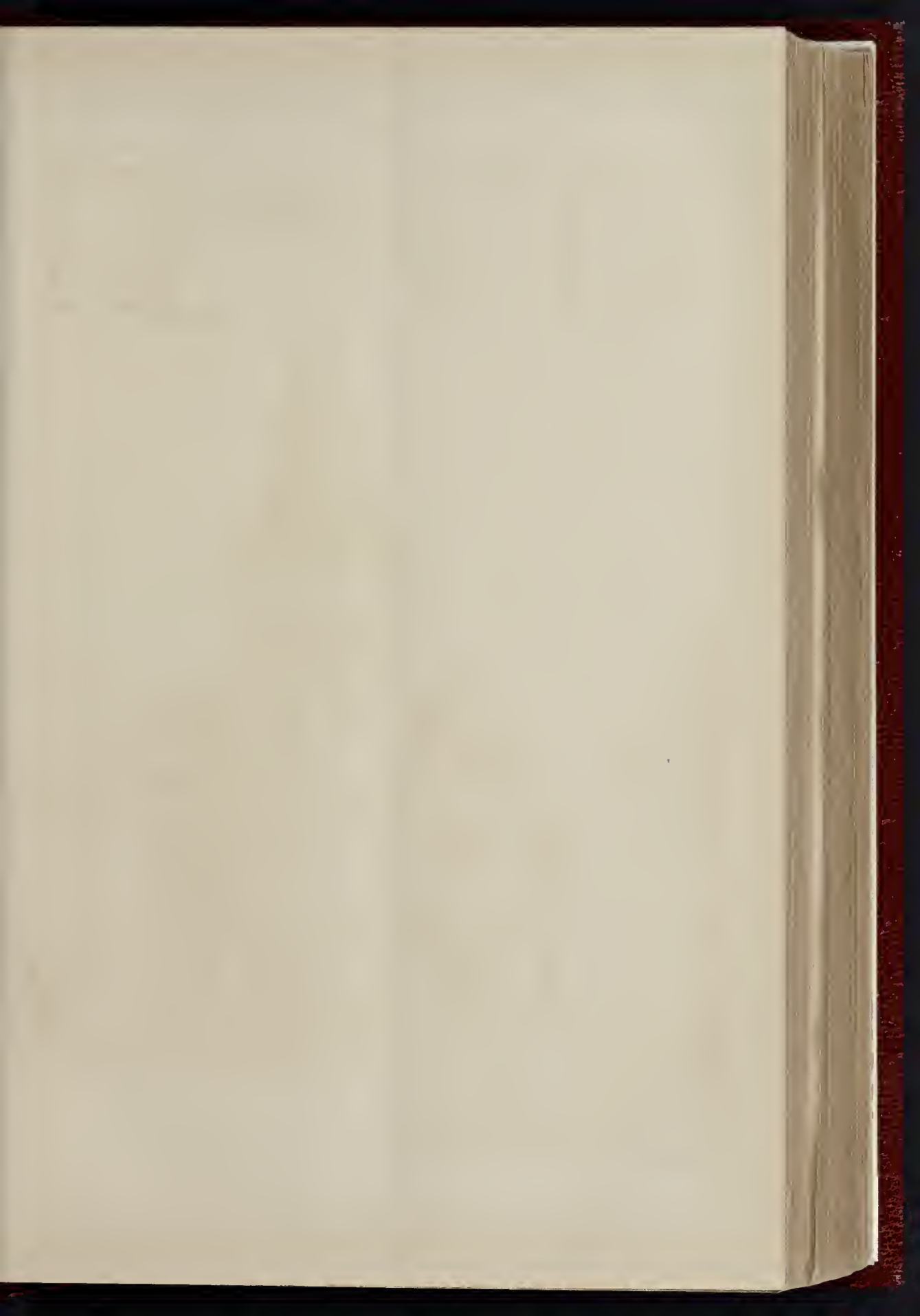
First Floor Plan.



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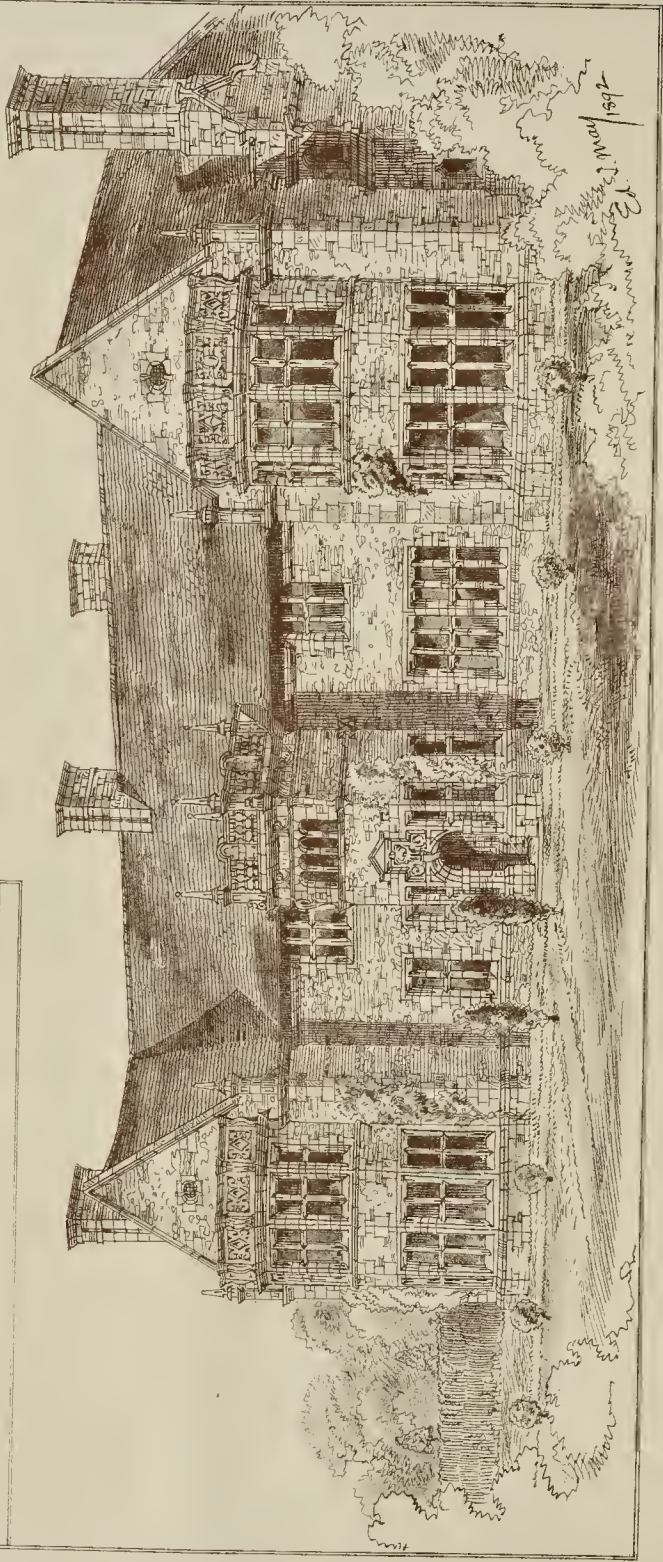
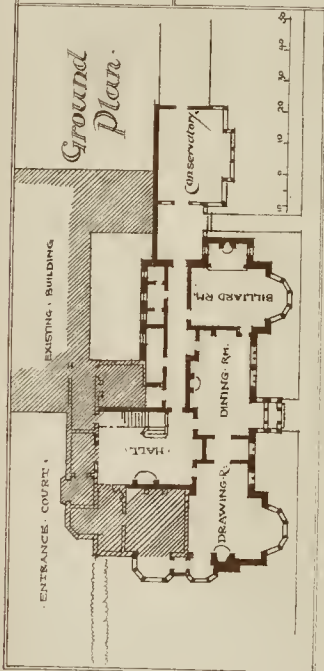
SELECTED DESIGN FOR BARRETT BROWNING MEMORIAL BUILDING, LEDBURY

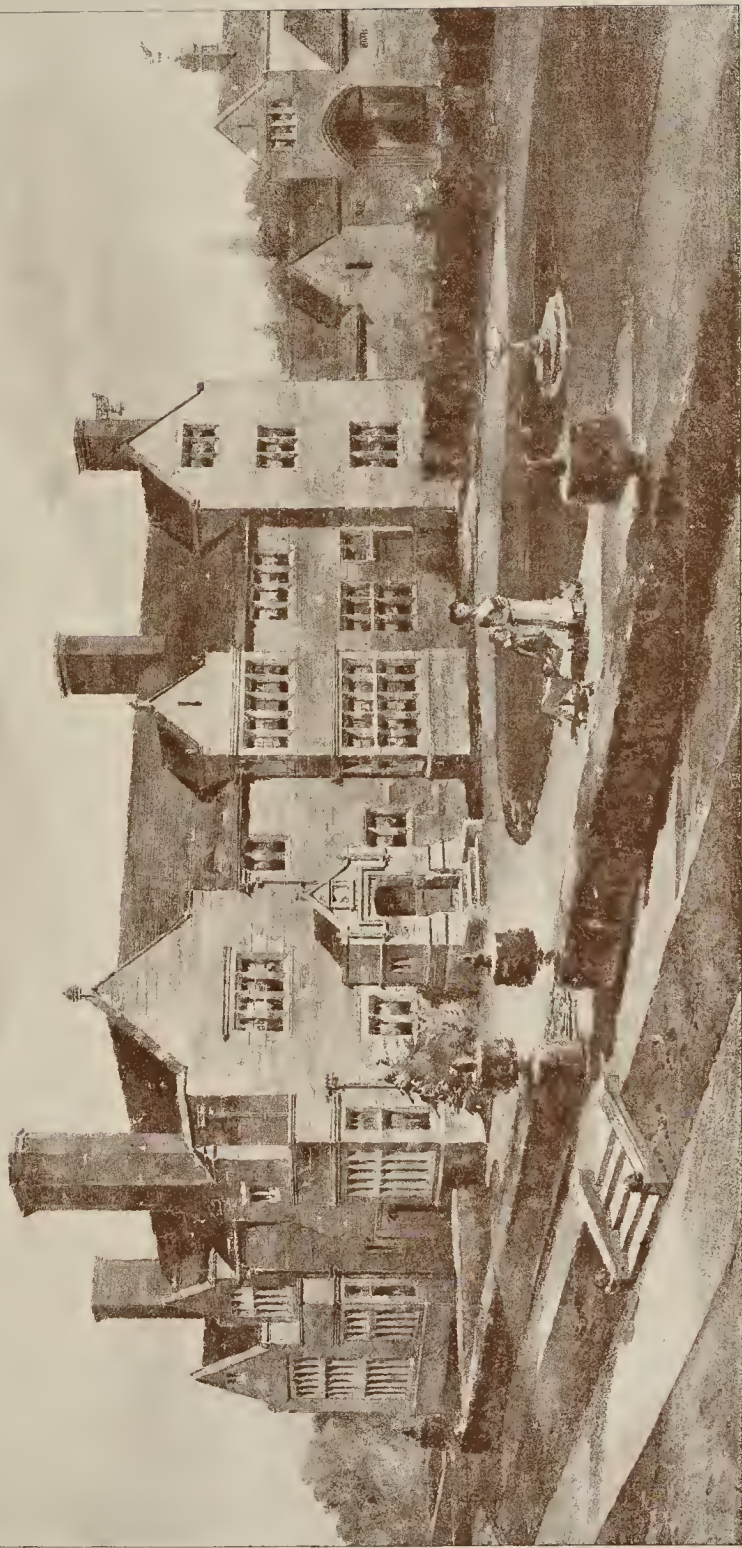
MR. BRIGHTWEN BIRSON, A.R.I.B.A., ARCHITECT.



THE BUILDER, JULY 9 1892

*Addition to
KIRKLEVINGTON GRANGE, YORKSHIRE.
The Garden Front from S.E. E. J. MAY, ARCHT.*





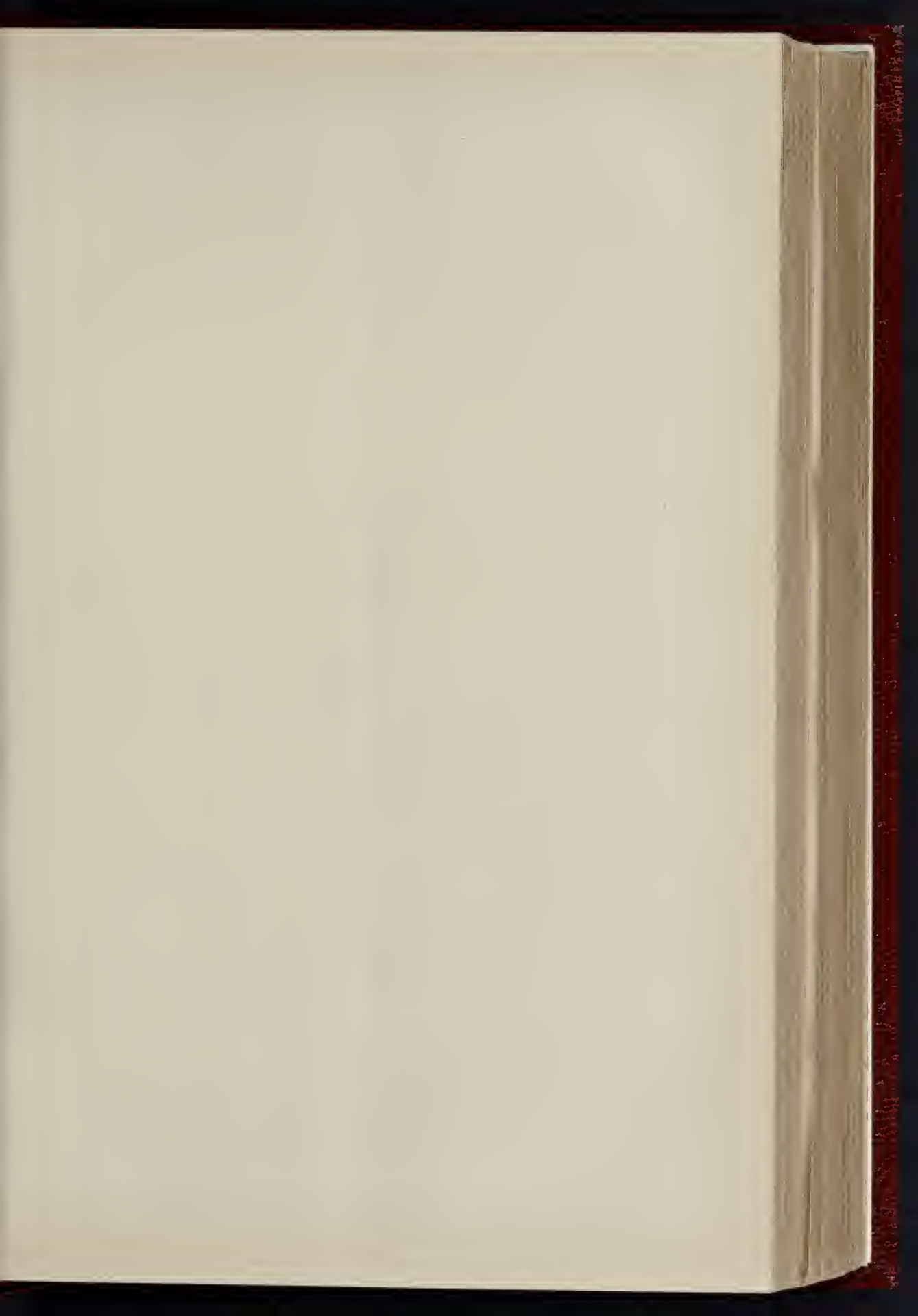
THE ARCHITECTS' AND BUILDERS' CONTRACTORS' AND DECORATORS' ASSOCIATION.

Royal Academy Exhibition, 1892

FIRSDENE, LICKEY, BROMSGROVE—MESSRS BATEMAN & BATEMAN, ARCHITECTS



TOWN HALL, BATTERSEA VIEW OF PRINCIPAL STAIRCASE - MR E W MOUNTFORD, F.R.I.B.A., ARCHITECT





SELECTED DESIGN FOR OXFORD MUNICIPAL



PHOTO-LITHO SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER, LANE E.C.

LDINGS.—MR. H. T. HARE, A.R.I.B.A., ARCHITECT.

the Parliamentary Committee to consider what action should be taken."

The recommendation was agreed to. After discussing other business, the Council adjourned at half-past four.

THE PROPOSED NEW STREET FROM HOLBORN TO THE STRAND.

We referred in one of our "Notes" last week, and in our report of the proceedings of the London County Council, to the scheme for a new street from Holborn to the Strand which has been submitted to that body by its Improvements Committee. We now give a plan of the projected thoroughfare, together with the following passages from the report of the Committee:

"Of all the improvements required by the actual traffic of London, none is now more urgent than an adequate and direct thoroughfare between Holborn and the Strand. The removal of the bars on the Bedford estate, to which the Council attached so much importance, and also the opening of parts of Eosebery-avenue, have caused a great and sudden increase of traffic from North of Holborn down to the Strand and the river. When Rosebery-avenue is completely opened this will be much increased. The obstruction at the point where Southampton-row and Little Queen-street intersect Holborn has now become most serious, and we are informed that sixteen constables are required to regulate the traffic there. The block in Little Queen-street is almost constant, and at all hours of the day vehicles are brought to a standstill for several minutes. A reference to the map will show that this is the point to which the whole of the immense and increasing traffic from Easton, St. Pancras, and King's-cross stations, Islington and Bloomsbury, converges on its way southwards to the Strand and Fleet-street, or the river and bridges. From Holborn, at Southampton-row, to the Strand, the only communication at present is through narrow, circuitous, and disconnected streets and lanes, in parts passing through a most insanitary and dilapidated district.

After carefully considering a variety of competing plans, we now submit to the Council the following scheme, the aim of it being as follows,—

(a) To combine a first-class thoroughfare from Holborn to the Strand with the widening of the Strand at Holywell-street and at St. Mary-le-Strand.

(b) To open a direct thoroughfare from the north to the Strand, Temple Bar, Fleet-street, and the Embankment going eastwards, as well as for the traffic towards the Strand, Wellington-street, and Waterloo Bridge westwards.

(c) To improve the communication between the Covent Garden or Long-acre district and the Lincoln's Inn district.

(d) To open and improve one of the most insanitary and decaying quarters of London.

(e) To offer an opportunity for a central and commanding site for a new County Hall.

It will be seen that the leading features of the new scheme are—(1) to combine the Holborn and Strand thoroughfare and the widening of the Strand in a single plan, instead of dividing them in two plans; (2) to obtain a much more direct and effective avenue from Holborn to the Strand than is possible in the Catherine-street scheme; (3) to provide for the traffic after reaching the Strand to go eastwards to the City, or on to the Embankment, instead of directing it solely towards Charing-cross and Waterloo-bridge. These objects would be effected by driving a new avenue of great breadth from Holborn at Little Queen-street straight southwards to the church of St. Mary-le-Strand, setting back the Strand at the junction, and opening out the southern end of the avenue east as well as west on two inclines gradually descending into the Strand. Of course this would include the removal of the block of houses south of Holywell-street, and the dealing with the enclosed spaces adjoining the two churches. The proposed street would intersect Great Queen-street, Sardinia-street, Vere-street, Stanhope-street, Wych-street, and Drury-court, and would pass close beside the crowded and insanitary area of Clare-market and contiguous streets lying between Sardinia-street and King's College Hospital. At the same time, we propose to widen Blackmore-street and White Hart-street by setting back their south-eastern City side, so as to afford a direct communication into Catherine-street and Wellington-street, and thence to Waterloo Bridge.

It is undoubtedly an objection to the schemes presented last year for widening the Strand and for connecting Holborn and the Strand, that they involved two perfectly distinct sets of works, which did not in any way assist each other, or combine with each other. Simply to remove the block of buildings south of Holywell-street would be to leave the Strand still obstructed by the Church of St. Mary-le-Strand, and to force the entire traffic

(which would have on the east of the church a breadth of more than 100 ft. to pass south of St. Mary's, where the space is hardly 50 ft. Some economists have even advocated the removal of this graceful church, but it may be taken for granted that such an act of vandalism would now be received with public indignation. In the present scheme the church would be immensely enhanced in value being set in the middle of the widened Strand, the traffic of the Strand passing freely north and south of it. Moreover, the church would become the central point of a noble street to the north, and would be western end of the Strand. If the Strand is to be widened to the north of it, the church will one day be pulled down, and one of the picturesque landmarks of Old London will be lost for ever.

It is also an objection to the new street from Holborn to Catherine-street as proposed last year, that it provided for the traffic westwards only, and not for the traffic going towards the Courts of Justice, Temple Bar, and the City. To obviate this, it was at first suggested to construct a new spur street along Wych-street to St. Clement Dances, but this was afterwards dropped. The Catherine-street scheme involved a line longer than that to St. Mary's church (which is just 70½ yards), and, if combined with the inevitable line to St. Clement's, it would be about one-third longer. At the lower end the gradient was bad,—1 in 35. Again, the Catherine-street plan could afford no architectural termination for a grand new street, nor would it allow of direct access to the Embankment. It would be a curved street of irregular plan set at an acute angle with the Strand, and not opening on to Wellington-street or any other distinct feature of the Strand.

Together with the scheme proposed last year, we have considered a variety of alternative schemes suggested at different times, and we believe that they all will be found wanting the simplicity and breadth of the scheme we now propose. They all fail to deal with the Holywell-street block, and with the very narrow existing hits of the Strand north and south of St. Mary's Church, whilst the scheme we propose provides for both. The gradients also of our proposed scheme are far easier.

If the new street were carried direct to Waterloo-bridge it would fail to provide for the traffic passing to Fleet-street, the district of St. Clement Dances, and the Thames-embankment; and to meet this traffic, say the whole of that passing from the Bloomsbury, Covent-garden, and Long-acre districts towards Temple Bar, there would be needed a second and very costly spur street through New Inn or Clement's Inn to St. Clement Dances.

The scheme for carrying the new street along the western side of Lincoln's Inn-fields would meet with determined opposition from the powerful legal interest, which would struggle to maintain the quiet of Lincoln's Inn and Lincoln's Inn-fields; and at the same time it involves an ugly, inconvenient, and costly bifurcation at the south-western corner of Lincoln's Inn-fields in order to reach Waterloo-bridge on the west and St. Clement Dances on the east.

Experience has proved that the attempt to avoid the acquisition of expensive buildings in the laying out of new streets by selecting an irregular line ultimately becomes a very false economy. The new street so planned has neither beauty, dignity, nor convenience. It bears the stamp of a makeshift; the costly buildings which were purposely left outside the limits of deviation on the Parliamentary plans, thrust unsightly and awkward ends into the frontage of the new avenue, and entirely ruin any architectural features it might have. The new street at once gets a bad name, and never acquires the character of being a desirable site. The history of many new streets designed in the last thirty years affords abundant evidence of the failure of all makeshift plans in the construction of new streets. A striking example of a large profit being realised from a street planned on a noble scale is that of Northumberland-avenue. This was no doubt a case with exceptional circumstances, such as are not likely to occur again. Even as it goes, it is an instance of a large and bold design proving in the long run the truest economy.

It has been too much the custom to hanker to neglect the very material part which is played in a metropolitan improvement by those elements which awaken general interest and strike the public imagination. Hence it is that a large and bold scheme is often both less costly and more convenient than two or three apparently economical and insignificant schemes.

A great artery of London, if it is to be a success, even peculiarly, must be made on a scale worthy of its importance. A direct street, passing in a straight line from Holborn at Southampton-row to the Strand at St. Mary's, would become one of the most desirable in all London, from its close proximity to the Courts of Justice, Court of Bankruptcy, the Inns of Court, Lincoln's Inn-fields, Somerset House, Holborn, the Strand, and the legal, printing, advertising, journalistic, and theatrical centres. It would receive the whole traffic passing out-westerly from Islington, Rosebery-avenue, Taubold's-road, the Bedford Estate, and the three northern railway

stations; and it would divert much of the traffic now passing through Endell-street, Bow-street, Wellington-street, Drury-lane, and Chancery-lane. On these grounds it is suggested that the street should be perfectly symmetrical, and not less than 100 ft. in breadth, so as to allow for lofty buildings of the most important class on its frontage. The northern end of the new street would open, with rounded corners, on Southampton-row, which must ultimately be widened by the removal of the block of buildings between it and Kingsgate-street. Indeed, it is a serious question if this should not be included in the present scheme. Thence it would cross Great Queen-street, and continue, at a distance of about 150 ft., parallel to the western side of Lincoln's Inn-fields to Sardinia-street. Here, about half-way in its course, should be a circus, at least 200 ft. in diameter, on the site of Sardinia-street and Vere-street, so as ultimately to allow a good street eastwards into Lincoln's Inn-fields and Portugal-street, and an improvement of Great Will-street, Kenble-street, and Russell-street, so as to afford a line to Long-acre and to Covent-garden.

Thus the central circus would ultimately communicate with Endell-street, Long-acre, Russell-street and Covent-garden on the west, and with Lincoln's Inn, the Courts of Justice, College of Surgeons, King's College Hospital, Bankruptcy Court, and Chancery-lane on the east. A wide opening here is needed to allow the traffic passing east and west between Chancery-lane and Covent-garden to cross the traffic passing north and south between Holborn and the Strand. From this central circus the new street would pass in a perfectly straight line to the Strand exactly opposite to St. Mary-le-Strand Church, crossing Vere-street and Clare-street, Stanhope-street, Wych-street, and Drury-court, a large part of which is a most insanitary area, with houses only fit to be pulled down. The district generally is described in Mr. C. Booth's book on 'Labour and Life of the People' as having a crowded and very mixed population, and much of it is marked in his map with the dark colours of 'poor' and 'very poor'. Ultimately the bulk of this district lying between Drury-lane and King's College Hospital must be rebuilt, if only because the houses cannot stand much longer, since they are amongst the oldest left in London. Many of the persons who now occupy them are compelled by their work to live in the district, and it is a question whether the formation of a new thoroughfare might not afford an opportunity for the Council to undertake a comprehensive scheme for rebuilding the people displaced. This very difficult question should be at once undertaken by the Public Health Committee.

Fortunately the important question of gradients has been completely solved by a scheme of our Engineer. The gradient of the proposed street at no part exceeds 1 in 50, and that only for 150 yards, whereas the gradient of several streets descending into the Strand is at present less than 1 in 50. For the 400 yards from Craven-buildings to Great Queen-street the gradient would be only 1 in 82; and thence to Holborn, a distance of 150 yards, the gradient is not more than 1 in 110. This gives an average gradient of about 1 in 75.

It is proposed to terminate the new street as it approaches the Strand with a terrace at a somewhat higher level than the present level of the Strand, and to bring the road by a gentle curve east and west into the Strand, opposite Somerset House on the west and Surry-street on the east, opening thence on the Strand as in a semicircle or oblong. The gradient of the slope from the southern end of the new street into the Strand westwards would be only 1 in 69, and of the slope into the Strand eastwards 1 in 50.

The Church of St. Mary-le-Strand would thus stand cleared from buildings on its northern side for a length of about 400 ft. There would be ample space to allow nearly 60 ft. on the northern side of St. Mary's for the Strand traffic on the present level, the traffic going to the City passing north, and that coming from the City passing south of the church. By a terrace about 200 ft. long and 2 or 3 ft. high, as in Trafalgar-square, the traffic descending from Holborn could pass by two easy inclines either east or west to the Strand. The open space, which would measure on the average about 350 ft. in length by 100 ft. in depth, would easily admit of adornment by a fountain or memorial.

The consideration of the Report has been deferred until July 19, owing to the General Election.

TECHNICAL AND FISHERY SCHOOL, RINGSBEND, DUBLIN.—On the 20th ult. the first stone of the new technical and fishery school at Ringsbend was laid by the Earl of Pembroke. The site, which has been given free by the Earl of Pembroke, is on the sea side of the town between Cambridge-road and the South Wall. The building is to be erected in accordance with a design by Mr. W. Kaye Parry, architect, of Dublin, and the contractors are Messrs. Collen Bros., of Portadown. The building will be faced externally with red pressed facing brick. The entrance will be at the centre of the eastern façade, and will be surmounted by a tower.

* We published the plan of this proposed street in the Builder for July 25, 1891.—Ed.



Proposed New Street from Holborn to the Strand, as Recommended by the Improvements Committee of the London County Council.

Books.

Insurance. A Manual of Practical Law. By C. F. MORRELL, Barrister. London: A. & C. Black. 1892.

THIS is one volume of a series of manuals on English law which are now being issued by Messrs. A. & C. Black. It deals in a clear and readable way with the whole subject of insurance, namely, with fire, life, and marine insurance, and with some of the miscellaneous and less important forms of the subject, such as fidelity guarantee insurance. The book is well done, it is sufficiently popular in form to be of use to non-legal persons, but whether a work of this small compass can be of any use to lawyers, except students, appears to be doubtful. To some extent, also, the practical aspects of marine insurance are so different to those of fire and life, the subjects are of importance to such quite different classes of persons, that we cannot but think it would have been better to have put marine insurance in a separate volume. A sketch of the history of the various forms of insurance forms a part of this book, and it will interest a good many of our readers to be told that the first fire insurance office was the Hand-in-Hand, established in 1693, and the second the Sun, established in 1710. From that date offices began to increase with more rapidly, six more coming into existence between the latter date and the end of the century. Of a manual such as this it would be inappropriate to speak at length, but it may be desirable to give an extract in order to show the character of the book. This is the explanation of the word "fire":—"The word fire is taken in the ordinary and popular sense, and in order to substantiate a claim, the loss must have occurred (1) by actual ignition of the property insured, or of some matter near it not intended to give heat, whereby injury has accrued to the property insured; and (2) the fire must have been the proximate cause of the loss" (p. 95). It will be seen that Mr. Morrell states his proposition clearly and without undue elaboration. There must be many of our readers who will be glad to have this book on their shelves, even though they may never have to open the pages which touch on the subject of marine insurance.

Road Construction and Maintenance. New York: The Engineering Record Office. 1892.

THIS is a collection of prize essays, reprinted from our contemporary, *The Engineering Record*, of New York, the results of a competition instituted by that paper, and completed in March last. America being comparatively a new country, a large portion of the essays is naturally taken up with the construction of new roads. The relative merits of the Telford and McAdam systems are considered—the former appearing to be most in vogue. We think, however, that the Telford system is only suitable for city and town roads, and that even then it is one of doubtful economy. Interesting particulars are given as to earth, sand, and clay roads; and a description of brick pavements, which, as far as we are aware, have not been tried in England. With regard to the maintenance of macadamised roads, very great stress is laid upon drainage of the subsoil, selection of the best available material, constant repair, and the use of the steam-roller is most strongly advocated—points which, we fear, are too often neglected in our own country roads. One of the essayists draws a parallel between the civilisation of a people and the condition of its roads. We sincerely trust that our civilisation may not be put to this test; though we believe American civilisation would come out, on such a test, still worse than our own. We recommend all those interested in the improvement of our "ways" to obtain this little book.

Biographical Sketch of George Melkè Kemp, Architect of the Scott Monument, Edinburgh. By THOMAS BONNAR, F.S.A.Scot. Edinburgh: W. Blackwood & Sons.

In spite of the atrocious character of its detail, the Scott monument at Edinburgh may be recognised as a creditable attempt to originate something special in the way of a modern monument; there is an idea in it, and the man who designed it, considering his disadvantages of education, must be admitted to have possessed ability and some force of character, and as such, was worth commemorating in a bio-

graphy. From Mr. Bonnar's book we learn that George Melkè Kemp was born in the last decade of last century, and of humble origin. In his boyhood he was sent to herd cattle, and it is stated that his father having gone to see how the lad was attending to the duty imposed upon him, "he found him setting mills a-going in the burns." Finding that his son was not fitted to be a shepherd, he, like a sensible man, took steps to permit of his following the bent of his mind and apprenticed him to a wright and carpenter, and being employed by his master in various matters in connexion with mansion-houses and farm-buildings, he acquired a taste for architecture. He set himself to cultivate his mind, studied "the five orders," and learned the art of drawing. After acquiring sufficient mastery of the pencil, he visited and took drawings from Rosslyn Chapel, Melrose Abbey, and other Gothic remains, which excited his admiration, ultimately extending his visits to England and France. Mr. Bonnar narrates that upon one occasion when Kemp was in the neighbourhood of Melrose, trudging along the road to Galashiels, clad in workman's garb, with his tools slung over his shoulder,

"He observed a gentleman in a carriage, who had evidently directed his coachman to ascertain how far the burdened traveller was going. On receiving the desired information, Kemp was asked to take a seat beside the coachman, and, accepting the welcome invitation, he was driven to Galashiels, where, on his alighting, some of the people standing by, remarked that he had been riding with the 'Shirra.' He then discovered that the kindly and considerate gentleman was no other than Sir Walter Scott, who had chanced to be travelling in that district in the discharge of his duties as Sheriff of Selkirkshire."

Shortly after Sir Walter's death a subscription was set on foot for the purpose of raising a fund to erect a memorial worthy of "The Wizard of the North." This appeal was adequately responded to, and a Committee was formed to procure designs, who advertised offering three prizes of fifty guineas for the three best. When the award was announced it was found that a design by Mr. Rickman was placed first, one by Mr. Charles Fowler, architect, and Mr. R. W. Sievier, sculptor, second, while the third was given to an unknown artist, named "John Morvo," the name adopted by Kemp.

None of these designs were adopted, but the competitor was reopened. Although that of John Morvo had made a deep impression, it was thought that to recommend the work of an unknown man, who had no professional training as an artist, would be a rather hazardous course to follow. In the second competition additional competitors appeared, amongst others, David Roberts, R.A. In entering upon the second trial, Kemp adhered to his original conception with some modifications, which were thought to be improvements, and ultimately his was adopted. Whether there was anything in the competition better worth adopting, it is impossible to say now.

This sudden uprise to fame of one previously unknown has something of the romantic element in it, and that is followed up by the tragic end of Kemp's career, shortly after his great success. His body was found in the Forth and Clyde Canal, and a suspicion of suicide lingered around the event. Mr. Bonnar, however, contends that there is no ground whatever for that surmise; he was in a position to look to the future with the brightest hopes, and to see his great work realised would surely have been a sufficient cause to make him desire to live. The occurrence is a sufficiently melancholy one in itself, without calling in the supposition of suicide.

As Kemp was not in practice as an architect, there are no other works of his to point to but the Scott Monument. There are some designs of his on paper, amongst others a scheme for completing Rosslyn Chapel, which, as our readers are aware, is merely the chance of what was intended to be a complete church. He also made a drawing showing Melrose Abbey restored. In the present day it is somewhat difficult for any one with a knowledge of the best Gothic style and detail to feel much toleration for his celebrated Monument, but in these days it was unquestionably a great effort for a self-taught man, and one must regret that its author did not live to obtain chances of improving his knowledge of Gothic detail by the study of purer examples than Melrose and Rosslyn, and of possibly producing something better than the one structure by which his name is known.

Simple Explanations of Engineering Formulae. By R. W. WESTERN. London: B. T. Batsford. 1892.

STUDENTS of civil engineering commencing to study for their profession should be grateful to Mr. Western for his capital book, in which he explains how many of the principal formulae relating to the stresses in girders are derived. To thoroughly understand many of these fundamental formulae, a slight knowledge of the differential and integral calculus is desirable, but so small an acquaintance with this branch of mathematics is really necessary that any one knowing algebra can easily acquire it in a very short time. Many authors try to avoid using what is termed the higher mathematics, and to show how some formulae are obtained, they are forced to adopt laborious methods, generally more difficult to master than the rudiments of the calculus. Mr. Western, however, first teaches his readers sufficient calculus for his purpose, and then proceeds to apply this knowledge to practical questions. There are many engineers who, day after day, make use of rules and formulae which they are unable to deduce; but if they will carefully study this little book, it would not be long before they are able to verify for themselves what before they have blindly accepted.

Electrical Instrument Making for Amateurs. By S. R. BOTTONE. Fifth Edition. Revised and Enlarged. London: Whitaker & Co. 1892.

We have already noticed an earlier edition of this work (*Builder*, August 31, 1889), and we have little to add to the opinion then expressed. Mr. Bottone's strong point is still the clear description of details of manipulation, his weakness is still in theory, and in all that relates to the dynamo.

The preface to this edition announces that the author, at the suggestion of Mon. Pellissier, has added "a few simple instructions for making a small arc lamp, an incandescence lamp, a current reverser," &c. We turned with interest to these, for we felt some curiosity as to what an amateur's glow lamp might be.

We find a wonderful arrangement in cork, red sealing-wax, and benzine vapour (the last in place of a vacuum), with a platinum filament, which "will glow with a cherry-red light when a current of one ampère is passed through it." For this it is claimed that it "illustrates in a satisfactory manner the mode in which the superior carbon filament lamps act." So it does—but a hair-pin would illustrate it quite as well, and with much less trouble.

Correspondence.

To the Editor of THE BUILDER.

ROMAN BRICKS AND CONCRETE.

SIR,—In your article on concrete you refer to Professor Middleton's opinion that the brick facing of Roman walls is not strong enough to support the concrete hearting while wet, and his reason for believing that timber uprights were used in the walls of Nero's Golden House. If this be so, it seems odd that so economical a people as the Romans should have wasted time and money on this brick facing, which was to be plastered or covered with marble; but it is surely worth the while of some one to make the experiment. Oven tiles cut diagonally would make the facing of a pier, say a yard square, and *poco costum* may, I think, be obtained in London. G. ARCONSON.

IRON IN CONFLAGATIONS.

SIR,—I shall be glad if some of the readers of your valuable paper could inform me whether rolled-iron joists and cast-iron columns are injuriously affected by being exposed to the effects of water played upon them in a severe fire. If, of course, they must be rejected; but if not, would they be as trustworthily as before for carrying weight? A. B.

PAVING COMPOSITION.

SIR,—I have a small floor to lay on wood blocks in a district some twenty miles from any station, for which it would be very costly to send a specialist to do the work. Will any of your practical readers kindly give me recipe for making composition for this purpose, stating proportions of pitch, &c., also quantity required for, say, 20 yards super? W. H. T.

CRYSTAL PALACE ELECTRICAL EXHIBITION.

The following are the Awards made by the Jurors:—

DIPLOMA OF HONOUR.

- | | |
|---------------------------|------------------------|
| H.M. Post Office | Exchange Telegraph Co. |
| L. B. & S. C. Railway Co. | Crosley Bros. |
| L. C. & D. Railway Co. | S. & W. J. & Co. |
| L. & N. W. Railway Co. | Willans & Robinson |
| National Telephone Co. | |

DIPLOMA OF HONOUR AND GOLD MEDAL.
(Highest Award.)

- | | |
|----------------------------------|---|
| Brush Electrical Engineering Co. | Edison & Swan United Electric Light Co. |
| Crompton & Co. | Johnson & Phillips |
| | Siemens Bros. & Co., Ltd. |

GOLD MEDAL.

- | | |
|-------------------------------------|---|
| Coxeter & Son | Henley's, W. T., Telegraph Works Co. |
| Davey, Paxman, & Co. | The Laming, Wharston, and Down Construction Syndicate |
| Easton & Anderson | Nalder Bros. & Co. |
| Electrical Construction Corporation | Sney & Farmer |
| Electrical Power Storage Co. | White, J. |
| Glover, W. T., & Co. | |

SILVER MEDAL.

- | | |
|----------------------------------|------------------------------------|
| Acme Electric Co. | Giles, F., & Co. |
| Anderson, R., & Co. | Groves, W. |
| Andrews, J. E. H. | Groth, L. A. |
| Armstrong's Glass Co. | Gulcher Electric Light & Power Co. |
| Barclay & Son | Hammer, W. J. |
| Benham & Froud | Joel, H. F., & Co. |
| Bristol, L. | Laing, Wharston, & Down |
| Britannia Rubber & Kambalton Co. | Lloyd & Lloyd |
| British Gas Engine Co. | London Metallurgical Co. |
| British Stone & Marble Co. | Mosses & Mitchell |
| Brownell, Lindley, & Co. | Osler & Co. |
| Campbell Gas Engine Co. | Rashleigh Phipps & Dawson |
| Chubb & Son | Richard Freres |
| Consolidated Telephone Co. | Richards, E. M. |
| Davis & Timmins | Scott, Ronald A. |
| Day & Co. (Bath) | Snyder & Co. |
| Dent & Co. | Trent Gas Engine Co. |
| Dick, Kerr, & Co. | Warby, J. L. |
| Edison Manufacturing Co. | Waygood & Co. |
| Epstein Accumulator Co. | Wells Bros. |
| Ferranti, Ltd. | Western Electric Co. |
| Fielding & Platt | Weymarch Battery Syndicate |
| Power Wiring Cables Co. | Woodhouse & Rawson |
| General Electric Co. | |

BRONZE MEDAL.

- | | |
|--------------------------------|--------------------------------------|
| Allsop & Co. | Lacombe & Co. |
| Anders, Elliot, & Chetham | Lewis, J. |
| Strude | Lundberg, A. P. |
| Appleton, Burbey, & Williamson | Maquay Electric Light Syndicate |
| Archer Pipe Co. | Mayer, H. |
| Becker & Co. | Mining and General Electric Lamp Co. |
| Bishop, W. J. | Napier & Son |
| Bowron, G. | Newton, F. M. |
| Burby & Son | Riedel, J. |
| Captaine Gas Engine Co. | Roberts, Allard, & Co. |
| Charlesworth, Hall, & Co. | Roper's Electrical Engineering Co. |
| Cooper, H. & A. | Smith, Samuel, & Son |
| Croggon & Co. | Spencer, Edward, & Co. |
| Dorman & Smith | Spence, J. |
| Electric Stores, Ltd. | Stegmann, G. |
| Faraday & Son | Taylor & Tucker |
| Fowler, Lancaster, & Co. | Telegraph Manufacturing Co. |
| Haghook, W. J. | Thorpe, Harry |
| Hindley, E. S. | Tipping, H. S. |
| Hookland, Downley, & Co. | Trinity Engine Works |
| Hornacoustic Speaking-tube Co. | Walter Hartnell |
| International Electric Co. | Ziety & Co. |
| Jenner, P. | |
| Jennings, G. | |
| Jooss, A. | |

The Students' Column.

CONCRETE.—II.

I.—LIMES.—CLASSIFICATION.

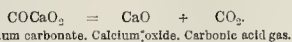
LIMES are not all suitable for use in concrete. Some of them possess the property of setting under water to a considerable extent, and will eventually attain great strength in such a position, while others are almost entirely soluble in water, and are therefore useless in damp situations. Some have an inherent power of hardening in the presence of water, whereas others merely dry to a friable mass. They are usually classified as follows:—

1. Rich or pure or fat lime.
2. Poor or impure or meagre lime.
3. Hydraulic lime.

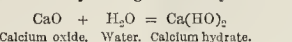
1. *Rich Lime.*—Composition.—Rich lime is burnt from stones which consist almost entirely of carbonate of lime (calcium carbonate), such as chalk, marble, and some of the varieties of building stone. Other substances, —silica, alumina, magnesia, oxide of iron, &c.,—may be present to the extent of about 10 per cent. The silica is present in the form of sand, and therefore has no beneficial effect on the setting of the lime.

Calcination.—We do not propose to enter into a detailed description of the modes of

manufacturing either limes or cements; it will be sufficient for our purpose if we state broadly the effects of the processes of manufacture. By the burning of calcium-carbonate, the water and carbonic-acid gas which it contains are expelled, and calcium-oxide, commonly called "quicklime," remains. The chemical equation, omitting the water, is thus expressed:—



Slaking.—When rich lime arrives on the building-site for use in mortar or plaster, it is in the form of quicklime or calcium oxide, but in that state it is not ready for use. It must first be slaked by the addition of water. Quicklime readily combines with water, and is, if exposed to the atmosphere, gradually slaked by absorbing moisture therefrom; in this slow way quicklime is slaked for agricultural purposes, the little white heaps in fields being a familiar sight in some parts of the country. If, however, a considerable quantity of water be added, the calcium oxide combines with it with much violence and heat, falling to a powder two or three times the bulk of the lime prior to slaking. This increase in bulk, when quicklime comes into contact with water, must be borne in mind, for the fact has an important bearing on the subject of the proper use of hydraulic limes and cements. This chemical change caused by slaking is thus expressed:—



Setting.—Calcium hydrate, or as it is usually termed, slaked lime, is soluble in water; consequently a paste made from it does not set or harden under water. There is nothing in its composition, as there is in hydraulic limes and cements, to give it the power of setting merely on the addition of water. Calcium hydrate, if placed in foundations or in the interior of thick walls, where little or no air can obtain access to it, will remain calcium hydrate for years without any increase of strength whatever. In air, however, a certain amount of chemical action takes place, which results in the hardening of the lime. This is effected by the absorption of CO₂ from the atmosphere, but the setting is more apparent than real, for it is only skin deep. And not only is this re-formation of carbonate of lime (CaCO₃) a mere skin, it is also of no great strength. It is probable, also, that the lime dissolved by the water used in slaking the lime and making it into mortar and also by the slow absorption of moisture from the air, gradually crystallises, and therefore assists the hardening of the mortar, but as 750 parts of cold water are required to dissolve one part of lime, the crystallisation is decidedly slow. Mortar from the interior of the Pyramids, where it has not been exposed to the action of the air, still contains free lime, although it is 5,000 years old.

Another difficulty attending the use of rich lime is its great shrinkage or contraction during the process of hardening; in order to obviate the ill-effects of this, a large quantity of sand is mixed with it to form mortar. The sand also fulfils another office, for it renders the mortar more porous, and, therefore, assists the passage of air and moisture to the interior of the mortar.

No more need be said to show the unsuitability of rich lime, not for concrete only, but for all manner of building work where cohesive and adhesive strength is required, but a knowledge of the changes which take place in the calcining, slaking, and setting of rich lime is necessary for the proper apprehension of some of the changes which take place in hydraulic limes and cements, and also of the difficulties and dangers attending their use.

Uses.—Rich lime is used for agricultural purposes, for internal plastering, and in the manufacture of Portland cement, slag cement, &c.

2. *Poor Lime.*—Poor lime is burnt from limestones, which contain a considerable quantity (say, from 10 to 30 or 40 per cent.) of matter nearly the whole of which is in such a state as to have no power of combining with the lime and exerting a beneficial effect on the setting of it. In other words, poor lime is rich lime very much adulterated. It has all the disadvantages of rich lime, and one or two more. It slakes more sluggishly than rich lime, and does not increase as much in bulk or fall to as fine a powder. It requires more careful screening and grinding on being made into mortar

than does rich lime. It ought never to be used for concrete.

3. *Hydraulic Limes.*—These limes have been so called from the property they possess of setting under water. The word "hydraulic" used in this sense is somewhat of a misnomer, seeing that it is derived from the Greek *hydro*; water, and *aulos*, a pipe, and really refers to the conveyance or use of water by means of pipes. Custom, however, has sanctioned its use in the sense of "setting under water," and also the use of the noun derived from it—"hydraulicity," which is taken to signify "the property or power of setting under water." Hydraulic limes vary exceedingly in their composition, and consequently in their hydraulicity. The quantity of lime present in some is only about 60 per cent., while in others it is 80 or even 90 per cent.; and the time required for the lime to harden under water varies from one or two days to three or four weeks. This variety has given rise to a subdivision of the class into (1) *feebly*, (2) *moderately*, and (3) *eminently* hydraulic, but these subdivisions are somewhat indefinite, merging into one another, and ranging from the verge of rich and poor limes on the one hand, to the verge of natural cements on the other. Moreover, no lengthy list of British hydraulic limes has, as far as we know, ever been made in which the various limes have been classified under these three heads. The nomenclature, however, affords a convenient method of expression, although it has not much practical or scientific value.

Composition.—The most important hydraulic limes owe their hydraulicity to the clay, which forms part of the raw stone. In stones producing feebly hydraulic limes, the clay may be about 8 or 10 per cent. of the whole; moderately hydraulic limes, from 10 to 15 per cent.; and eminently hydraulic limes from 15 to 20 or even 30 per cent. Any excess of clay over 30 per cent. is detrimental to the setting power and strength of the lime.

Another class of limes consists of those which contain little or no clay, but are rendered hydraulic by the magnesia present in them. In the raw stone, producing moderately hydraulic lime, the carbonate of magnesia may be 30 or 40 per cent. of the whole, and the carbonate of lime 50 or 60 per cent. Nearly all limes and cements contain a small quantity, say, 1 or 2 per cent., of magnesia, but it is only when the magnesia reaches about 30 per cent. of the whole stone, that it confers a moderate hydraulicity. The most important class of hydraulic limes, however, is the one in which clay plays a prominent part, and as clay is the ingredient which confers hydraulicity on that most important of all limes and cements, namely, Portland cement, more attention has been devoted to the study of its action in combination with lime, than to that of magnesia with lime. We shall, therefore, devote our attention chiefly to limes which owe their hydraulicity to the presence of clay, or, in other words, silicate of alumina.

Undoubtedly the most important class of hydraulic limes consists of those which are burnt from the blue lias limestone. They vary considerably in their setting power and ultimate strength. The blue lias stone is found at Lyme Regis in Dorsetshire; at Pyile, and Watchet, in Somersetshire; at Barrow-on-Soar, in Leicestershire; at Rugby, Stockton, Wilmetote, and other places in Warwickshire; at Barnstone, near Nottingham; at Kirtou Lindsay, in Lincolnshire; at Atherhaw, in Monmouthshire; at Whitby, in Yorkshire, and at various other places in England. At many of these places, the stone is used for the manufacture of Portland cement, which is often equal to that made from chalk and clay, or mud, as at Rochester and other places on the Medway and the Thames.

Feebly hydraulic limes are obtained in many parts of the country, but have merely a local reputation. Some of those used in London are obtained from Sussex.

Other hydraulic limes are burnt from the carboniferous limestones, as at Holywell, in Flintshire, and others again from the magnesian limestones in Yorkshire, Derbyshire, and other counties. Limes of the latter kind, as we have stated above, owe their hydraulicity chiefly to the chemical union of the lime and magnesia on the addition of water. They frequently attain considerable strength, but the author is not aware of any actual tests having been carried out to show the difference between them and other hydraulic limes. An analysis of a good hydraulic lime, obtained from a magnesian

limestone near Doncaster, in Yorkshire, will be given in the table of analyses in the next article.

GENERAL BUILDING NEWS.

MANCHESTER CATHEDRAL RESTORATION.—What is assumed to be the finishing stroke of the present restoration of Manchester Cathedral, which has now been going on for some twelve years or more under the direction of the architect, Mr. Crowther, has been commenced. This is the taking up of the entire flooring in the south aisle of the nave, forming what is the Trafford Chapel and Brown's Chapel. The flooring is not only being taken up, but is being lowered to the same level as the floor of the nave. This is preparatory to the proposed scheme of relaying the whole of the floor of the nave in diamond-shaped blocks of black and white marble. By the time this work is completed on the south side of the nave, it is anticipated that the new south porch and baptistry will also be completed, and the former south entrance, which has been closed for a considerable time, will be once more utilised.

CLOCK-TOWER, KEIGHLEY.—This town being without a reliable public clock, some of the leading inhabitants undertook to supply this want, and sent circulars to the Governors of the Keighley Institute and others in furtherance of the above project, when Mr. Prince Smith, one of the life members of the Institute, undertook to raise the tower so as to afford space for four large illuminated dials, and for the clock, chimes, and five large bells in the tower bell at his own cost, and in memory of the late Mr. Prince Smith, senr., his father. The governors having accepted this gift, Mr. Prince Smith gave instructions to Messrs. Mason & Hudson, architects, to prepare plans for the necessary alterations, which have now just been completed, the masonry having been done by Mr. M. Booth, and the joiner work by Mr. Thos. Smith, Keighley. The order for the clock and chimes and bells was given to Messrs. Wm. Potts & Sons. The clock shows the time upon four 8 ft. illuminated dials, and strikes the hours and St. Mary of Cambridge chimes upon 3 tons of bell metal.

ALTERATIONS TO HADDINGTON ABBEY.—On the 30th ult., Haddington Abbey, which for the past nine months has been undergoing renovation, was re-opened. The alterations have been carried out at a cost of over £5,000. The architects were Messrs. Hay & Henderson, Edinburgh. An organ is being erected at a cost of 1,000.

WESLEYAN CHAPEL, CROSSGATES, NEAR LEEDS.—On the 2nd inst., the foundation-stones of a new chapel for Crossgates were laid. When completed, the new buildings will consist of a chapel providing sitting accommodation for 400 on the ground floor, and 100 in an end gallery, with vestry, &c.; but for the present only about three-fifths of the entire length is being erected, to accommodate about 300 on the ground floor. The buildings are being erected for the design and under the superintendence of Mr. Geo. F. Danby, architect, of Leeds. They are to be in the Decorated Gothic style, and built of pressed bricks with stone dressings. The width of the chapel will be 40 ft., and the length 60 ft., with open timbered roof, rising to a height of 32 ft. in the centre. The internal wood work will be of pitch pine and varnished. Mr. Paul Rhodes (mason and bricklayer), and Mr. T. Harrod (joiner) have the work of erection in hand. The estimated cost of the new building is 1,100.

NEW CHURCH, GREAT CROSBY.—On the 25th ult., Bishop O'Reilly laid the foundation-stone of the new church and presbytery of SS. Peter and Paul, Liverpool-road, Great Crosby. The cost of the building will be 6,000. The new building, the architects of which are Messrs. Sinnott, Sinnott, & Powell, Liverpool, will contain 500 sittings. The contractor for the building is Mr. Samuel Webster, Bootle.

PUBLIC BATHS AND TECHNICAL SCHOOL FOR BATLEY.—The memorial-stones of the Public Baths and Technical School now in course of erection at Batley were laid on the 2nd inst. The public baths are situated between Cambridge-street and Wellington-street, and the dimensions are to be 134 ft. by 123 ft. The walls externally will be of Delft stone, lined with white, brown, yellow, and black glazed bricks. The first-class swimming-bath will be 75 ft. 6 in. in length and 33 ft. 6 in. broad. A second-class swimming-bath will be 55 ft. 6 in. by 45 ft. There are to be 20 slipper-baths, which will be divided into first and second class. Rooms are to be reserved for Turkish baths. The entrance to the building is to be from Cambridge-street, and over this will be the caretaker's house. The cost of the baths is estimated at about 8,000. The plans have been prepared by Mr. W. Hanstcock, of Batley. Messrs. T. Bradford & Co., of Manchester, and Messrs. J. Bagshaw & Co., of Batley, are the engineers engaged. The mason's work is being done by Mr. Isaac Nelson, and the joiner's work by Mr. Henry Brooks. Mr. Joseph Hepworth is clerk of works. The site of the technical school is opposite that of the baths. The building will be three stories high, and will accommodate about 300 students. The design now being carried out is

only half of what it is suggested the structure shall ultimately be. It is arranged so as to allow for the duplication of the building now in course of erection at some future time. In accordance with the regulations of the Science and Art Department, there will be lecture-rooms, a chemical laboratory, and other necessary departments. The structure, exclusive of fittings, will cost about 3,500.

ADDITIONS TO THE PARISH CHURCH, HAYDOCK, LANCASHIRE.—The new portion of the Parish Church of St. James, Haydock, and the annex to the graveyard adjoining, were recently consecrated by the Bishop of Liverpool. The new erection, which has now been completed from plans of Messrs. Douglas & Fordham, of Chester, includes a chancel, organ chamber, and side aisles, and is capable of seating over 600. The total cost of the building, inclusive of the organ and wall round the graveyard, is 4,734. 15s. 6d.

NEW MILITARY CHURCH, ALDERSHOT.—Her Majesty the Queen laid the foundation-stone of the new military church, Stanhope Lines, South Camp, Aldershot, on the 27th ult. The building is of Early English design; the walls being in red bricks, and the dressings in St. Albans Box Ground stone, from the quarries of the Bath Stone Co., Limited, Bath. The contract is being carried out by Messrs. J. Dorey & Co., of Brentford, under the superintendence of Colonel Waller, Major Pitt, and Lieutenant Michie. When finished it will have a length of 139 ft., and a width of 84 ft., and is calculated to seat 1,012 people.

THE PROPOSED EXTENSION OF THE STOCKPORT WORKHOUSE.—The Stockport Board of Guardians received on the 27th ult. a letter from the Local Government Board with reference to the scheme formulated by the guardians for the extension of the Stockport Union Workhouse. The letter stated that the Board were advised by their inspector and architect that the plans were very unsatisfactory in principle, and notwithstanding the large expense—estimated as at least 15,000—afforded practically no increase of accommodation for the sick, and left the domestic and administrative departments of the workhouse untouched, except as regards the laundry offices, which, under the new scheme, would be better and more convenient. Moreover, the plan did not show any improvement or increase in the accommodation for the able-bodied and infirm men, nor any improved classification amongst the men and boys. These very serious defects in the plans appeared to the Local Government Board such as to require that they should be carefully reconsidered, and it seemed to them that, as under the scheme proposed, practically the entire area of the premises would be absorbed, while the amount of accommodation afforded would, as they were advised, be inadequate for the wants of the union as at present constituted, it would clearly be inexpedient to award the large outlay that would be involved upon the present site, and then find it necessary at a later date to obtain an additional site elsewhere. For the works contemplated, moreover, a loan for the full period of borrowed money would not be allowed, and the money or part in ten and part in twenty years, would then fall more heavily on the rates for the next few years than if a more comprehensive and satisfactory scheme were adopted, under which the cost of land and structure might be defrayed by a loan repayable in the full period of thirty years.—The Guardians resolved to refer the report to the House Committee. The architect of the Local Government Board some time ago recommended the erection of a new workhouse at a cost of about 50,000.—*Manchester Courier.*

FRANCISCAN CHURCH, CHILWORTH, SURREY.—On the 23rd ult. the new Catholic church and Friary recently erected on Blackheath, Chilworth, were opened. The building is in the Late Perpendicular style. It is constructed of Egham stone, with Chilworth stone facings, and the internal woodwork is of oak and Oregon pine. In addition to the high altar there are four side altars, which are chiefly of alabaster. There is accommodation in the Friary for about twenty-six members of the Order. The architect was Mr. Walters, of Westminster, and the contractors Messrs. Longley & Sons, of Crawley.

WESLEYAN CHAPEL FOR TAIBACH, GLAMORGAN.—On the 23rd ult. foundation-stones of a new Wesleyan Chapel at Taibach were laid. The contractor's estimate for the work is 1,450. The building will measure 44 ft. 3 in. by 33 ft. 8 in. A front gallery will be fixed on either side of the gallery, the front gallery to be used as an organ and chamber. The architect is Mr. John Wills, and the contractors Messrs. D. C. Jones & Co., Gloucester.

WESLEYAN CHAPEL, NEW FERRY, CHESHIRE.—A new Wesleyan chapel was opened on the 14th ult. at New Ferry, by the Rev. T. B. Spohnson. The chapel has accommodation provided on the ground floor for about 520 in nave, transepts, and chancel. Two main entrances have been arranged, one by the octagon porch, to the left, and the other by the tower porch to the right. The chancel is fitted with side pulpit, provision being made for communion-table, &c., on a raised platform. A minister's vestry, with lavatory accommoda-

tion, has been provided. The scheme includes future school buildings at the rear, with accommodation for about 450 children in school and class-rooms. The internal woodwork and fittings are of pitch-pine varnished, and the external woodwork of red pine. The heating is by hot-water pipes, and the ventilation by means of patent ridge tiling. The windows are fitted with lead cathedra. A large traceried window has been designed in the front gable, and all the chapel windows have enriched tracery heads. The whole of the building, except rear elevation, are of Bath Portland stone from Helsby, and the window and door dressings, &c., are of Rancorn stone. The roofs are slated in alternate red and blue bands. The contract for the chapel portion of the scheme has been carried out by Messrs. Kelly Bros., of Walton, for the sum of 2,375. From the designs and under the superintendence of Mr. Thomas W. Gibson, architect, of Birkenhead, whose plans were selected in a limited competition. The masonry has been executed by Mr. Hobson, of Liverpool; the glazing by Messrs. Wilkison; and the plumbing by Mr. John Pugh.

NEW CHURCH AT CUDWORTH, YORKSHIRE.—The corner-stone of a new church was laid on the 24th ult. at Cudworth, by Miss Edith, wife of Lord Barnsley. The church, which is to accommodate 250 worshippers, is to be in the Early Decorated style, from designs by Messrs. Smith & Crook, of Gouls and Hull. The total cost of the church is probably to be about 2,000. The contract has been at the 2,000. Messrs. Denj. Graham & Sons, Huddersfield.

CATHOLIC SCHOOLS, PENZANCE.—On the 20th ult. the Rev. C. Graham, Bishop-Coadjutor of the diocese, laid the corner-stone of a new elementary mixed school at Penzance, to accommodate 100 children. The school will contain one large room, with classrooms and the usual offices. Mr. O. Caldwell is the architect, and Messrs. A. Tryball and W. H. Tronson are the contractors. The cost of the school will be about 1,000.

NEW CHURCH, HIGHTOWN, LIVERSEDE, YORKSHIRE.—On the 11th ult. Mr. Walter Freeman, of Knaresborough, laid the corner-stone of a new church at Hightown, Liversede. The building, the plans are by Mr. W. S. Barber, of Halifax, and the style is Early English. A tower and spire are shown, but these are not to be built at present. The nave and aisles will be 50 ft. by 20 ft. and 9 ft. 6 in. respectively, and chancel 28 ft. 6 in. by 20 ft., with organ-chamber and vestries, and the building will seat 380 people. Messrs. W. & J. Miner, of Mirfield, are the contractors.

FOREIGN AND COLONIAL.

FRANCE.—The demolition of the ruins of the Palace of St. Cloud is shortly to be proceeded with. It is necessary, as they are quite dangerous to pedestrians.—Meissonier's country house at Poissy is to be sold in a few days. It contains many of his paintings, some of them very interesting.—The Compagnie des Chemins de Fer de l'Est have just commenced working the new strategic line from Briec-onto-Carhaix, Vermeuil, in the continuation of the line from Paris to Vincennes and Joinville.—The new railway from Thiers to Nouton has just been opened.—The clock-tower of the church of Remorant has been destroyed by lightning. A rich amateur has just left an interesting collection of books and works of art to the museum and library of Montpellier.—A committee has been formed at St. Malo to erect a statue in one of the squares of the town to the French navigator Sarracul.—The archaeological congress has finished its work at Orleans.—The congress next year will be held at Abbeville.—A committee has been formed at Bourg-Saint-Andol (Ardèche) with a view to raise a monument to the republican deputy Madier de Morjani, who has recently died.—Next month the bronze statue of Eugene Pelletan, the writer, will be inaugurated at Bayan; it is the work of M. Aude, and was in the Champ Elysees Salon this year.—The monument to Clement Marot which was inaugurated at Cahors on Sunday last has been constructed from the designs of M. Solodosse, architect. The sculptured portions have been done by MM. Tarcan and Puech, and M. Olivier Merson has designed the mosaic decoration. The whole thing is in the Renaissance style; in the centre is the bust of the poet surrounded by pilasters, supporting a shield bearing the arms of Cahors; the base is ornamented by a bas-relief in marble.—There has just been a solemn unveiling of the statue of Joan of Arc at Rouen. This remarkable monument has been made from the designs of M. Juste Lisch, the Inspector-General of Historical Monuments. The statue of Joan of Arc is the work of M. Ernest Barrias, who has made the heroine standing, with chained hands, bare head, and short hair, just as she must have appeared at the moment of her execution. The unveiling was in this year's Salon.—The Historical and Archaeological Society of Maine have taken possession of the celebrated house known as Queou

Berengaria's, which a rich inhabitant of Mans had bought and restored at his own expense for the Society. This house, which is also known as the "House of the White Queen," dates from the time of Charles VIII. or Louis XII.—There is to be an international exhibition of fine arts held at Monaco, in a special pavilion, from November 15 till April 15, 1893.—The new Town-hall of the Eighteenth Arrondissement, built by M. Vercollier, and which will replace that of St. Euphrasie at Montmartre, will be opened on the 17th inst. The new hospital Debrousse, at Paris, is also to be opened soon.—The committee formed to erect a monument to Alphonse has given M. Formigé the commission for the plan, and has also instructed a sort of limited competition amongst the sculptors. M. Garnier has suggested placing the monument at the entrance to the Avenue of the Bois de Boulogne.—At the end of the Congress visit to the Palais de Justice most of those present signed an address to M. Coquart, expressing their admiration of his work in the great room of the Court of Appeal.

MISCELLANEOUS.

LINCOLNSHIRE AND NOTTS ARCHITECTURAL SOCIETY.—The annual excursion of the Architectural and Archaeological Society of the Counties of Lincoln and Nottingham took place on the 22nd and 23rd ult. The Rev. Arthur Sutton, of Brent Brocton, and the Hon. General Secretary of the Society, and the Rev. H. J. Cheales, Vicar of Friskney, acted as the hon. Local Secretary. There were about thirty-five ladies and gentlemen in the party on the first day, and on the second day there were nearly fifty. The Rev. Precentor Venables, of Lincoln, accompanied the party, and gave interesting descriptions of the various churches visited. The headquarters of the excursion were at Skegness. On the first day the party visited the following churches:—Wintborne, Ingoldmells, and Addlethorpe (the church of which is half-a-mile inland, and is perpendicular, somewhat of the Suffolk type. It resembles Ingoldmells in having been lopped of its chancel in 1705, but has been more fortunate than its neighbour in preserving its fine woodwork. The porch has a parapet of twining branches and a cruciform apex, with large figures of angels on the angle buttresses. Inside, the porch resembles that of Wintborne. The door is partly of old woodwork. On the north side of the church are six buttresses with grotesque figures bearing scrolls on which are inscriptions now scarcely legible. The nave is of five bays with light octagonal piers. The party also visited Burch, Gunby, Spilsby, Halton Holegate, Bratton (the church of which has recently been restored by Mr. James Fowler, of Louth), Thorpe St. Peter, and Croft All Saints. The excursionists then returned to Skegness, where the annual dinner took place, after which a meeting was held and a paper read by the Rev. H. J. Cheales, on "The Mural Paintings in Friskney Church." On the second day of the excursion (Thursday), the party drove to Wainfleet, and inspected the Magdalen College School. They then visited Friskney All Saints, Wrangle, Leake, Leverton, Benington All Saints, Butterwick, Freiston, and Fishtoft. Skirbeck Church was also visited, and the company then proceeded to Boston and dispersed.

SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS.—The fifteenth annual meeting of the Society for the Protection of Ancient Buildings was held last week in the old hall of Barnard's Inn, Holborn. His Honour Justice Lushington presided, and in the course of his address said (according to the Times report) that the Society was actuated by the most interesting historical which desired to promote a care for, interest in, and study of the past, and pity towards the past. That was often done in a narrow parochial way; but it need not be so, and when they remembered all they owed to the past it was a most reasonable spirit, and quite one of the most important currents of thought in our time. Had the age in which we lived any real care for outward beauty or for the arts that echoed and illustrated that outward beauty, or for the historical associations that were often so very deeply bound up with ancient and beautiful monuments? He thought he would be a brave person who would claim praise for it in that respect. Let them think of the long lines of jerry-built houses and the loss of the race of art workmen disappearing from among us. Let any one think of the immense difficulty under which architecture, painting, and sculpture were now being carried on among us. There had been a beautiful architecture in England, and a fine race of art workmen, and a great number of churches scattered up and down the land, so that there really had been opportunity for every one to familiarise himself with beauty and dignity of work. Those churches which had been praised by the poets were the victims of our ignoble restoration.

EMIGRATION.—We have received the following circular from the "Emigrants' Information Office," 31, Broadway, Westminster, in regard to the prospects of work in different Colonies:—"In Canada there is likely to be a good demand during this quarter for farm labourers, general labourers,

navies, and for mechanics in the building trades. The Canadian Government is offering bonuses of 5 dol. to 10 dol. a head to those who take up land in the North-west or British Columbia. In New South Wales mechanics are not wanted, but in some country districts there is a demand for experienced farm and general labourers. A large number of persons have applied for work at the Government Labour Bureau at Sydney. The depression in Victoria still continues, especially in the building and kindred trades. The stoppage or completion of railway and other public works has also increased the scarcity of employment. In South Australia there are good openings for ploughmen and for married couples on stations, but the supply of labour has been quite equal to the demand. The Queensland Government withdrew their free passages last February, so that now all, except nominated and indentured emigrants, have to pay full fares. There is no demand whatever for mechanics in Queensland, many carpenters, plumbers, and general labourers have been out of work, and no one, with the possible exception of a few ploughmen, should go there at present on the chance of finding employment. Western Australia still offers free and reduced passages to certain classes of emigrants; and there is a demand for a limited number of farm labourers, men in the building trades, miners, and labourers on railways and public works. In Tasmania, the silver mines at Zeehan are giving employment to considerable numbers of miners and others. In various districts of New Zealand, there is a demand for farm and station hands, and for miners; and prospects generally are good. The new Government Labour Bureau at Wellington is proving very useful, and new arrivals should apply there, or at one of its 200 country branches. Cape Colony and Natal offer reduced passages to mechanics, female servants, and others, for whom there is a limited demand. In all the above mentioned Colonies there is a demand for small capitalists, farmers, fruit-growers, and female servants. As it is announced that a Commission has been appointed by the Brazilian Government to encourage the introduction of European agricultural labourers into some of the northern provinces of Brazil, it becomes necessary to repeat again most strongly the warnings which have been frequently issued from this office against British emigration to that country. However great may be its natural resources, it has been abundantly shown that the conditions of life are wholly unsuited to the ordinary British workman, and intending emigrants are, therefore, most earnestly cautioned not to be induced by any offer of free or assisted passage, or grant of land to go out to Brazil."

TRADE FESTIVITIES.—Some seventy employees of Mr. F. Britton, builder, Leconfield road, N., journeyed to St. Albans last Saturday to hold their fourth annual banquet, Mr. Britton presiding at the dinner. The remainder of the afternoon was taken up by athletic contests, &c., and a visit to the Abbey.

MACADAMISED ROADS AND FROST.—The annual report of the Borough Engineer of West Hartlepool (Mr. J. W. Brown) contains the following note on the behaviour of macadamised roads under the influence of intermittent frost:—"The past winter has been one of the most severe known to me for macadamised roads. Sooner had they been somewhat consolidated than a succeeding frost completely destroyed the surface, and this was repeated almost daily for some months. The streets most affected by the frost are those whose foundations were made with marl (or soft limestone). Being very absorbent, it became thoroughly saturated during the rains, and when in this condition the frost expands the material, and so renders the surface almost that of a ploughed field."

THE ENGLISH IRON TRADE.—There is still but little alteration in the condition of the English iron market. Trade in all branches is quiet. The Cleveland Ironmasters' Association returns for June show that seventy-six furnaces are now in blast in that district, against three in May, and that the production of pig-iron has risen from 6,124 tons to 37,767 tons. A welcome diminution of stocks to the extent of 32,491 tons is also recorded. No 3 Cleveland pig is now down to 40s. per ton. In manufactured iron and steel there is little doing; but late rates are fairly well maintained. In tinplates there is less inquiry. Shipbuilders, on the whole, are only moderately employed, and in the majority of engineering establishments slackness prevails. The coal trade generally is less active.—Iron.

MUNICIPAL WORKS AT SCARBOROUGH.—Owing to great demands on our space this week, we are again obliged to hold over our report of the recent meeting of the Incorporated Association of Municipal and County Engineers at Scarborough.

CAPITAL AND LABOUR.

THE DISPUTE IN THE SHEFFIELD BUILDING TRADE.—According to the Sheffield Daily Telegraph, the dispute in the building trade in Sheffield is at an end, and the masons affected have resumed work. The difficulty was brought about

by the masons asking the employers to sign a code of rules. On meeting with a refusal to do this they struck work. The Master Builders' Association offered to refer the matter to arbitration, but the men declined to entertain the proposal. It is stated that work was offered the men by those builders in the town who are not members of the association, and who were willing to sign the rules. The associated employers have since followed their example in the latter respect, and affixed their signatures to the rules, thus bringing the strike to an end.

MEETINGS.

SATURDAY, JULY 9.
Architectural Association.—Visit to Colonel North's House at Egham, and to Egham Palace. Train leaves Cannon-street at 1.45 p.m.
St. Paul's Ecclesiological Society.—Visit to Canterbury. Train leaves Victoria at 10 a.m.

MONDAY, JULY 11.
Royal Institute of British Architects.—Adjourned General Meeting (Business), for members only. 8 p.m.
Clerks of Works' Association (Carpenters' Hall).—Monthly meeting. 8 p.m.

TUESDAY, JULY 12.
Glasgow Architectural Association.—Visit to Annfield School, Cable-street, Mr. J. L. Cowan, architect. 9 p.m.

WEDNESDAY, JULY 13.
Toynbee Hall.—Mr. T. G. Jackson, A.R.A., on "The Architecture of the Fifteenth Century." 8 p.m.

SATURDAY, JULY 16.
Liverpool Engineering Society.—Visit to the Liverpool Corporation Refuse Destructor and the Liverpool Cold Storage Company's Works.
Edinburgh Architectural Association.—The Sketching Club to meet at Roydon House, Garthside Park, Granton, to make measured drawings and sketches of the south front of the mansion. 3 p.m.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.
JUNE 27.—By Waystaff & Warnan: 9, Aberdeen-pl., Highbury, u.t. 58 yrs., gr. 14l., 1,140l.—By Sherrin & Colman: 250, Harrow-rd., Paddington, u.t. 52 yrs., g.r. 2l., r. 85s., 1,040l.; 23, Westbourne-ter., North, u.t. 58 yrs., g.r. 12s., r. 75s., 820l.; 231, New North-rd., Islington, u.t. 35 yrs., g.r. 6l. 6s., 200l.—By Chesterton & Sons: 238, Goldhawk-rd., Shepherd's Bush, u.t. 71 yrs., g.r. 7l., r. 40s., 510l.; 33, St. Mary Abbott's-ter., Kensington, u.t. 12 yrs., g.r. 10s., r. 84l., 690l.; 7, Napier-rd., u.t. 68 yrs., g.r. 8l., r. 62l., 104l., 510l.; the lease of 43, Euston-rd., St. Pancras, u.t. 11 yrs., 220l. By F. A. Luntley & Co.: 1, 2, and 7, Stamford-grove East, Clapton, L., c. 800, 1,140l.; 5, Stamford-grove West, f., and small part 1, 450l.; f. land, 13a. 2r. 33p., near Wonerab, 40s.; "Chinthur Villa", and 9a. 1r. 0p. f., 1,100l.—By G. Kendall: 1 and 2, Gubbins-lane, Harold Wood, L., r. 43s., 450l.; 45 to 51 odd, East Ferry-rd., Cubitt Town, u.t. 64 yrs., g.r. 12s., 450l.
JUNE 28.—By G. Stockings: 39 St. Mark's-rd., Notting-hill, u.t. 69 yrs., g.r. 6l., r. 38s., 205s.—By C. B. Smith & Hild: The Portsmouth, Frinton, and 8 withes Tramways Company, with plant and goodwill, 6,550l.—By Devereil & Co.: Nos. 361 and 363, Harrow-rd., u.t. 90 yrs., g.r. 34s., r. 240s., 2,470s.—By T. G. Wharton: I.G.R. of 24, Strømester, Stamford-hill, reversion in 94 yrs., 530s.; I.G.R. of 32l., 2,470s., 8 years Sisseter, reversion in 84 yrs., 640s.; I.G.R. of 14l., Fladbury-rd., reversion in 84 yrs., 290s.—By Hyggs & Son: 14 to 20, Queen's-rd., St. John's-wood, u.t. 45 yrs., g.r. 60s., 3,125s.; 76, St. John's-wood-ter., u.t. 42 yrs., g.r. 18s., r. 50s., 285s.—By Debenham, Tewson, & Co.: "The Kims" and 6 acres, Roehampton, L., 13,000s.; 6l., 62, and 63, Queen's-rd., St. John's-wood, L., r. 25s., 4,140s.; enclosures of land, Mayfield, Sussex, 53a. 2r. 0p. f., 1,240s.; "The Argos Estate", Monmouth.—"The Upper Gocket Farm", 60a. 3c. 34p., L., r. 30s., 700s.—By Driver & Co.: 29, Redfield-lane, Kennington, u.t. 79 yrs., g.r. 7l., 1,550s.—By W. & F. Houghton: F. house and ground, High-rd., Leyton, 600s.; "Higham Hill Farm", Walshamton, and 4a. 1r. 33p. f., 76l.; by Dyers, Son, & Hiltens: 67 and 69, London-st., Greenwich, L., 95s., 1,255s.; 1, Royal-hill, f., r. 20s., 230s.; 22, Guildford-rd., u.t. 34 yrs., g.r. 4l., 150s.—By Messrs. Colb (at Rochester): "Chinch-st. Farm", High Halstow, Kent, 49a., 1r. 27p., f., r. 54s., and 1 marsh land, 29a. 3r. 37p., 80s., 1,700s.; an enclosure of f. land, 2a. 0r. 21p., 80s.; four freehold cottages, Shore, r. 41l. 12s., 525s.; six freehold cottages and a shop, Higham, 1,035s.; an enclosure of f. land, High Halstow, 7a. 2r. 0p., r. 7l. 10s., 175s.; two freehold cottages with gardens, r. 10s., 155s.; enclosures, pasture and woodland, 48a. 1r. 3p., 480s.; enclosures of land, 7a. 1r. 1p., 175s.
JUNE 29.—By A. Richards: A plot of land, Church-st., Edmonton, 1a. 2r. 30p., f., 1,560s.—By Field & Sons: 19 and 21, Acorn-st., Camberwell, L., 285s.—By Zwanen & Co.: 39 and 41, Chichester-rd., Kilburn, u.t. 69 yrs., g.r. 15s., r. 80s., 650s.—By F. E. Elliott: 69 to 53 even, Dalryell-rd., Stockwell, u.t. 72 yrs., g.r. 20s. 5s., r. 140s., 1,005s.; 64, 78, 114, 118, 122, 129, and 136, Dalryell-rd., u.t. 72 yrs., g.r. 42s. 3s., r. 2,084s., 1,010s.; 82 and 84, Clifton-cres., Old Kent-rd., u.t. 89 yrs., g.r. 10s., r. 72l. 16s., 595s.; 58, 60, and 62, Danby-st., Peckham, u.t. 83 yrs., g.r. 13s. 10s., r. 78s., 650s.; 5, Wroxton-rd., u.t. 84 yrs., g.r. 5s., r. 33s. 16s., 225s.; 8 to 13, Burchell-rd., Camberwell, u.t. 76 yrs., g.r. 20s., r. 195s. 18s., 1,210s.; 50 to 58 even, Burchell-rd., u.t. 76 yrs., g.r. 16s., r. 132s. 11s. 4d., 832s.; 2 to 12 even, Cossall-st., u.t. 76 yrs., g.r. 24s., r. 203s. 10s., 1,240s.; 14 to 22 even, Cossall-st., u.t. 76 yrs., g.r. 20s., r. 167s. 8s., 1,050s. F. Jolly & Co.: 4 and 5, Cambridge-buildings, Bethnal Green, u.t. 67 yrs., g.r. 4l., 1,060s.; 4, Laura-cottages, Leyton, u.t. 81 yrs., g.r. 4l. 10s., 200s.;

PRICES CURRENT OF MATERIALS.

Table with columns for material names (e.g., Timber, Metals, Oils) and their respective prices per unit.

Table with columns for material names (e.g., Bricks, Tiles, Lumber) and their respective prices per unit.

Table with columns for material names (e.g., Cement, Iron, Glass) and their respective prices per unit.

TENDERS.

(Communications for insertion under this heading should be addressed to 'The Editor,' and must reach us not later than 12 noon on Thursdays.)

ACKWORTH (York).—Accepted for enlarging Rectory House, Ackworth. Mr. Wm. Watson, architect, Wakefield. 12/15 0/0

BANGLEY (Staffordshire).—For the re-erection and enlargement of the Rectory, Bangley, in Staffordshire, for Mr. A. G. Foster, Church Hill, Tamworth. Mr. T. W. E. Newton, architect, 121, Colindale Avenue, London, N.W. 1/25 0/0

BIRMINGHAM.—For the erection of a country house at Bartegrove, near Brighthelm, for Mr. F. Taylor, Mr. T. W. E. Newton, architect, 121, Colindale Avenue, London, N.W. 1/25 0/0

BIRMINGHAM.—For the erection of a "Pines," a summer cottage, for Mr. T. W. E. Newton, architect and surveyor, 121, Colindale Avenue, Birmingham. 1/25 0/0

BLACKPOOL.—Accepted for the terraces and work required in the erection and completion of the Blackpool Tower Buildings. Messrs. Messer & Co., architects, 1, The Terrace, Blackpool. 1/25 0/0

BURY (Lancs.).—Accepted for the erection and completion of the "New Royal" Hotel, Messrs. Maxwell & Tuke, architects, 29, Finsbury Square, Manchester. 1/25 0/0

CARDIFF.—For the erection of horse-boxes, stalls, grand stands, &c., for the Committee of the Cardiff and South Wales Horse Show, Mr. W. Ware, surveyor, Cardiff. 1/25 0/0

CARDIFF.—For forming, metalling, paving, kerbing, &c., several streets, in the Corporation, Mr. W. Ware, Borough Engineer, Town Hall, Cardiff. 1/25 0/0

CHESHIRE.—For girls school at Turford, for Rev. P. F. Young, architect, 25, Finsbury Square, London. 1/25 0/0

CHESHIRE.—For widening Botchery Bridge, Betchery, for the Cheshire County Council. Mr. G. B. Bell, County Surveyor, The County Offices, Chester. 1/25 0/0

LEADS.—For the erection of a new store for the Leeds Industrial Co-operative Society, Limited. Messrs. Hill & Son, architects, 25, Park Square, Leeds. 1/25 0/0

LEYTON.—For surface water drainage in Leyton and Leytonstone (two divisions), for the Leyton Local Board. Mr. Wm. Dawson, A. M. Inst. C. E., Engineer. 1/25 0/0

LONDON.—For repairing, ventilating, and decorating the Sutherland's Wesleyan Chapel, 47, drug on. Mr. J. Willis Chapman, architect, 1, South Molton Street, W. 1/25 0/0

LONDON.—For dividing the two large rooms of the boys' and girls' departments of the B. Grey-road School, Highgate-road, at the northeast end of the building, into three classrooms, for the School Board for London. Mr. T. J. Bailey, architect. 1/25 0/0

LONDON.—For additional alterations to Messrs. Bevan's premises, The Whiteley, Stratford E. Mr. Geo. Baines, architect, 4, Great Windmill Street, E.C. 1/25 0/0

LONDON.—For providing and fixing heating apparatus on the hot-water hot water system (with the necessary boiler) for the new schools now in course of erection on the three modern sites for the School Board for London. Mr. T. J. Bailey, architect. 1/25 0/0

LONDON.—For carrying out works to the drainage, &c., at the Whiteley-road School, Battersea, for the School Board for London. Mr. T. J. Bailey, architect. 1/25 0/0

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LONDON.—For alterations and additions to Upper Holloway Baptist Chapel, for the Rev. J. H. Wood and Committee. Mr. Frank E. Sues, architect, 15, West Smithfield, E.C. 1/25 0/0

LONDON.—For alterations and fittings to the "Dorset Arms, Leyton-road, Stratford E., for Mr. H. Dawkins. Mr. Fred. A. Ashton, architect, 3, Crooked Lane, E.C. 1/25 0/0

LONDON.—For re-building No. 51, Bank Street, Epsom, for Mr. Robert Henry Kerr, architect, Bewick House, 139, Oxford Street, W. 1/25 0/0

LONDON.—For alterations at No. 31, 23, 22, Poland Street, Mr. Robert Henry Kerr, architect, Bewick House, 139, Oxford Street, W. 1/25 0/0

LONDON.—For the erection of houses and shops, High Street, Stock Newington, Messrs. Saville & Martin. 1/25 0/0

LONDON.—For the erection of the "Flying Horse" Public-house, and property adjoining, Tottenham Central Road, Messrs. Saville & Martin. 1/25 0/0

LONDON.—For the erection of a warehouse, St. George's-in-the-field, for Messrs. Goss & Goss, Mr. Charles architect. 1/25 0/0

LONDON.—For erecting new villa residences, Willoughby Lane, Tottenham, for Mr. T. E. T. Triffin, architect, 5, Union Court, Old Kent Road, E.C. 1/25 0/0

LONDON.—For the erection of two hospital fever tents at the Eastern Hospital, The Grove, Hammersmith, for the Managers of the Metropolitan Asylum District. Messrs. A. & C. Harston, Architects, 15, Leadenhall Street, E.C. 1/25 0/0

LONDON.—For re-fitting water-closet rooms, &c., at the Western Fever Hospital, Brompton, Fulham, for the Managers of the Metropolitan Asylum District. Messrs. A. & C. Harston, Architects, 15, Leadenhall Street, E.C. 1/25 0/0

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OLEY (Yorkshire).—For the erection of new stores for the Leeds Industrial Co-operative Society—
 Plumbers—James Suttle & Son, Courthouse street, Oley £218 9 0
 Slater—Hayley Thornton, Oley 41 0 0
 Ironwork—C. J. Dawson, Leeds 248 13 6
 Plasterer—John D. Baskin, Leeds 80 0 0

OXFORD.—For cemetery chapel, caretaker's house, &c., for the Oxford City Council. Mr. W. H. White, M. Inst. C.E., City Engineer. Quantities by Messrs. Hunt & Stewart, 41, Parliament street, S.W. :—
 Robinson £7,019 (Shaper & Son) £2,500
 Parnell & Son 7,000 (Halliday, Stamford) 6,112
 Hutchins 8,475 (Jarvis) 6,100
 Wilkins & Son 9,427 (Accepted).
 [City Engineer's estimate, £10,083.]

SHEFFIELD.—For the erection of new front to salesrooms, West-ber, for Mr. R. S. Whitworth. Mr. W. H. Lamborne, architect, 11, East parade, Sheff. Quantities by the architect :—
 Mr. Loyley & Son £2,413 A. Baldry £1,219
 John Easby 2,387 Ben. Powell & Son 1,500
 Dalton & Evans 2,127 (Accepted) 1,500
 H. Dendall 2,010 Chas. Farrow 1,284
 T. J. Robertson 1,939 J. H. When 1,805
 Chambers & Son 1,522 [All of Sheff.]

STITTON COLDFIELD.—For the erection of a villa residence in Clifton-road, Stiton Coldfield, for Miss Shaw. Mr. J. W. F. Jones & Lloyd £2,801 (Johnson) 2,305
 Merton Hughes 447 (Sims) 395
 Trencham 412 (Accepted).

WAKEFIELD.—Accepted for enlarging St. Mary's Vicarage, Wakefield. Mr. Wm. Watson, architect, Wakefield :—
 Excavating, Brick and Stone—E. A. Eley £308 0 0
 & Co. 2,387 (Accepted) 2,390 0 6
 Slating—C. F. Kynell 35 10 0
 Plastering—C. Driver 18 10 0
 Carpenter and Joiner—C. Spilner 98 10 0
 Plumbing, Glazing, &c.—S. Atkinson 82 10 0
 Painting—Goodall & Lister 16 15 0

WAKEFIELD.—Accepted for alterations and additions to the Wakefield Union Workhouse. Mr. Wm. Watson, architect, Wakefield :—
 Excavating, Brick and Stone—E. A. Eley £308 0 0
 & Co. 2,387 (Accepted) 2,390 0 6
 Slating—C. F. Kynell 35 10 0
 Plastering—C. Driver 18 10 0
 Carpenter and Joiner—C. Spilner 98 10 0
 Plumbing, Glazing, &c.—S. Atkinson 82 10 0
 Painting—George Powell 7 14 0

WOOLWICH.—For rebuilding the "Duke of Wellington" Tavern, William-street. Mr. H. H. Church, architect, Woolwich :—
 Pughan Bros £2,700 (Johnson) £2,728
 Mundy & Son 2,800 (Accepted) 2,410
 Chessin & Son 2,750 Holloway 2,410

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THE INDEX and TITLE-PAGE for Volume LXII. (Jan. to June, 1892), are given as a Supplement with the present Number.

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Advertisements for the current week's issue must reach the Office before THREE O'CLOCK P.M. on THURSDAY, but those intended for the front page should be sent by TWELVE O'CLOCK on WEDNESDAY.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS, WANTS or ORDERS TO DISCONTINUE the same must reach the Office before TEN O'CLOCK on WEDNESDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have Replies addressed free of charge. Letters will be forwarded, if addressed to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is sent every week.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied direct from the Office to resident in any part of the United Kingdom at the rate of 10s. per annum Postpaid. To all parts of Europe, Australia, and New Zealand, 20s. per annum. To India, China, Ceylon, &c., 30s. per annum. Remittance payable to DOUGLAS FOURDREINER, Publisher, No. 46, Catherine-street, W.C.

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J. W. F. (Two long after date).—W. P. & Sons.—W. S. W.—"Competitor" (we cannot print letters not authenticated by name and address of writer).—G. H. B.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, and necessarily for publication. We are compelled to decline printing out books and giving addresses.

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Letters or communications (beyond mere news-items) which have been duplicated for other Journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

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SOLE AGENTS for England, J. & A. CREWE, Ombertland Market, London, N.W.

Asphalte.—The Szeysel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Pauln, E.O.—The heat and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tin-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co. [Advvt.]

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 Fetter-Lane, E.O. [Advvt]

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The Builder.

Vol. LXIII. No. 2580

July 16, 1892

ILLUSTRATIONS.

Decorative Panel: "Youth: the Toilers and the Idlers."—By Mr. G. Natorp	Double-Page Ink-Photo.
Royal College of Music, South Kensington.—Sir A. W. Blomfield, A.R.A., Architect	Double-Page Ink-Photo.
Houses, Cadogan Gardens.—Mr. F. G. Knight, Architect	Double-Page Photo-Litho.
House at Northwood.—Mr. R. A. Briggs, A.R.I.B.A., Architect	Two Single-Page Ink-Photo's.

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Proposed Changes at the Institute.



AS we noted in our leading article of the 18th ult., the proposed changes in the method of electing Fellows of the Royal Institute of British Architects by the

abolition of the ballot, have led to a discussion of the far more important question of the qualification for the Fellowship. The resolution which was to have been proposed by Mr. Charles Barry at the meeting which we were then considering was the subject for the adjourned general meeting held last Monday. The principle which Mr. Barry and those who think with him are eager to urge forward is that which was clearly contemplated when Section 3 of the Charter was drawn up and settled as follows:—

"Fellows shall be Architects who have attained the age of thirty years, and who have been engaged as principals for at least seven successive years in the practice of Architecture. After the expiration of five years from the date [March 28, 1887] of this, Our Charter, the Royal Institute shall have power to declare that every person desiring to be admitted a Fellow shall be required to have passed such Examination or Examinations as may be directed by the Royal Institute. But in special cases the Council shall have power to dispense with such Examination or Examinations."

The resolution which Mr. Barry moved on Monday last was as follows:—

"That, in view of the fact that young men only just past the prescribed age of thirty are, under the existing system, qualified to be elected as Fellows without evidence that they have passed any constituted examination evidencing their fitness; and whereas all candidates for the Associateship are now required to pass an examination to prove their fitness, and which does in effect do so; and whereas the above-named outside candidates for Fellowship can, so long as the existing system continues, evade all examinations until the Institute shall declare that no Fellow can be elected without a test examination; and whereas this may not take place for some time: It is desirable that the Council be instructed to take steps forthwith to obtain a declaration of the Institute that, from a given date,—say, two or three years,—every candidate for Fellowship shall be an Associate, or shall have

passed an examination qualifying him for Associateship, except in such special cases of age, merit, or distinction as shall justify the Council in dispensing with such examination under Section 3 of the Charter."

As we have before pointed out, the line of action indicated by Mr. Barry's proposition is really the only logical sequel to the adoption of the principle of examination as a test of the fitness of candidates for the Associateship.

The only direct line of opposition, therefore, which was taken to Mr. Barry's proposal was that championed by Mr. Beresford Pite, who, as the representative of the views of certain "eminent outsiders," attacked the Examination for the Associateship as vehemently and persistently as the chairman could allow without going too far from the question before the meeting.

Thus we have the issue clearly defined. On the one hand, those who believe the existence and continuance of the examination test for Associates to be of importance for the welfare of the Institute, cannot avoid the necessity for imposing some test for candidates for the Fellowship, inasmuch as it is not to be tolerated that it should be possible to say that any candidates for membership of the Institute can evade the examination by passing into the superior class of Fellows. On the other hand, those who are opposed to anything like an examination test for the Fellowship, feel themselves under a like necessity to oppose the existing examinations. This is evidently the position taken by the "eminent outsiders" to whom Mr. Pite referred. They object to the principle of examination *in toto*, because they see that it leads naturally to some kind of test for the Fellowship, and this, they fear, may lead ultimately to registration, although it by no means follows, as was implied by Mr. Pite, that it would necessarily do so.

We can hardly regard it as astounding to the dignity of the Institute that so much stress should be laid on the opinions of the "eminent outsiders." It cannot be forgotten that some of these gentlemen have, in the past, held themselves aloof from the Institute for reasons quite unconnected with the question of examination, and might possibly still stand aloof if examinations were abolished. Nor can it be denied for a moment that there

are within the ranks of the Institute men at least equal in every respect, both in position and in ability, to those without its pale.

If, therefore, the members of the Institute are convinced that the examination test is an advantage to the well-being of the corporate body, it would be the height of pusillanimity to sacrifice that conviction to the opinions of any outsiders, however high their position, or however transcendent their artistic ability.

The form in which opposition to Mr. Barry's actual proposition was made was by an amendment, brought forward by Mr. Alexander Graham, referring the subject to the consideration of the Council. This appeared to shelve the matter indefinitely, and thus probably received the support of those who are opposed to the principle of examination, and was contested by those who think the time has come for the Institute to avail itself of the permission accorded by Section 3 of the Charter.

Everyone seemed to admit that an examination for gentlemen who have arrived at such a point in their professional career as to be worthy of the dignity of the Fellowship would be, to say the least, a very difficult matter; and had the question been pressed to a division, it seems highly probable that the principle of electing Fellows, save in exceptional cases, wholly from the ranks of the Associates, would have been adopted. The modification, however, which Mr. Slater suggested to Mr. Graham's amendment, and which was adopted both by Mr. Graham and, on the President's appeal, by Mr. Barry, enabled the meeting to come to a unanimous decision to instruct the Council to take the whole matter into consideration, and to report to the Institute as soon as possible, with proposals as to the best method of carrying out Section 3 of the Charter.

We cannot but think that this was a wise and politic decision. The questions that are at issue are of such vital importance to the well-being of the Institute and of the profession, particularly amongst non-metropolitan architects, that it would be in the highest degree regrettable if a hasty decision was arrived at, either one way or the other.

We do not ourselves see how the Institute can go back on the policy of examining candidates for the Associateship, particularly in

view of the success which has attended that policy, especially in the provinces. This being so, the continuance of that policy necessarily involves that it shall not be easier to enter the superior than the inferior class of the membership.

The imposition of the examination test for the Fellowship is, however, practically an impossibility, and there therefore seems to be no better way out of the difficulty than to adopt the principle proposed by Mr. Barry's resolution, unless an entirely different character be given to the Fellowship, and admission to this superior class be reserved for those who have shown by their work that they are possessed of very much more than average artistic ability, and have also such a large measure of business capacity as shall have enabled them to induce the public to give them an opportunity of showing their pre-eminence in artistic power. This latter alternative is probably that which the anti-examination party would like to see adopted, but it can hardly be contended that such a class of members would be consonant with the spirit of the Charter, to say nothing of its letter.

It was probably with some idea of conciliating those who desire an increase of dignity for the Fellowship that Mr. Barry wished to amend the resolution of which he had given notice, by including a proviso that Fellows should be at least forty years of age, and have been twelve years in practice. This, of course, the President, as chairman, ruled out of order and contrary to the wording of the Charter that Fellows should be thirty years of age and have been seven years in practice. Mr. Barry's argument that the greater included the less was clever, but hardly satisfactory.

We trust that the Council will devote their best energies to the consideration of the important questions now before them, and, if necessary, adopt the course which some members advocate, of appointing a special committee to investigate the whole question in a thorough and deliberate manner.

OLD TOURAINE.

THE old province of Touraine, represented in the present day pretty nearly by the Department of Indre-et-Loire, is a kind of hallowed ground to architects and archeologists—hallowed in an æsthetic sense only, for certainly that adjective is about the very last one could apply to the historical associations connected with the châteaux of Touraine, which have witnessed about as much cruelty, treachery, and debauchery as any set of human habitations within the period of modern history. The contemplation of this side of the history of the old châteaux is not so inviting, in a sense, as the study of their architecture, but the whole interest of the places is very much increased if we take the human along with the architectural history, and keep before the mind's eye the picture of the men who built these grand houses, half castle half palace, the events that took place in them, the lives and personalities of the men and women who lived and died (or not infrequently were murdered) within their walls. Architectural students are rather too apt to forget this half of the picture, and to busy themselves merely with sketching the architectural details of Blois, and Azay-le-Rideau, and Chenonceaux; while historians, on the other hand, are often indifferent to the architectural value and significance of the buildings in which the actors of their drama lived and moved and had their being. The merit of Mr. Cook's book on "Old Touraine" is that of combining the two interests; to the character of a historian of men he adds that of a lover of architecture, and his book is a comprehensive sketch both of the general architectural character of the châteaux of Touraine, and of the lives and

character of their inhabitants, and the principal events which took place within their walls. Thus it ought to be a book of considerable interest to those architects who are anything more than mere "architectural practitioners"; they will not learn anything new about the architecture of the châteaux from Mr. Cook's pages, but they will find there an enlightened and enthusiastic interest in the architecture, coupled with a picturesque and vivid sketch of the life and the events which centred round them. Regarded in this way, the châteaux are no longer mere architectural efforts, serving to illustrate the history and changes of Late French Gothic and Early French Renaissance; they have a human interest as well; they are filled, to our imagination, with the exuberant, licentious, and often cruel and treacherous life of French society of the Late Mediæval and Renaissance period.

It is curious to note that a number of names familiar to every student of architectural history are included within this district of which Tours is the centre. A little way down on the right bank of the Loire is Langeais; above it, on the left bank, is Amboise; further up, on the right bank, Blois; not far up the Indre from the mighty masses of Loches castle; Fontevrault, Chenonceaux, and Azay-le-Rideau, are all included in the same district. In this district, till the end of the sixteenth century, the French Court, as Mr. Cook expresses it, "moved to and fro among the pleasant castles of Touraine," before it took up a more permanent and stately home at Versailles.

After a sketch of the early history of Touraine, the author commences his notes of special places with Chinon, at the junction of the Loire and the Vienne, where Jeanne d'Arc first made her appearance as the champion of her country, and where, according to Rabelais (whose statue stands in the marketplace) was the "voire (foire) première du monde." The interest of Chinon is rather historical than architectural, that is to say the architectural interest has somewhat crumbled and disappeared. "It is easy to people Blois with the gallants of Henry III's Court, or the intrigues of Louis XIV.; Chenonceaux tells its own light uneventful story in every ripple of reflected sunbeam on its graceful windows; but Chinon, greater in extent than all of them, a very wilderness of towers and battlements—Chinon is in ruins irretrievably." The author gives a sketch of the bridge and gate-house, and some description of the other architectural remains, including traces of Roman work, for Chinon was a Gallo-Roman station. It is melancholy to think that the room in which Jeanne d'Arc was first received by the king has been allowed to fall to ruin or be destroyed.

Fontevrault, to which the author next conducts us, is marked to the architect by one of the most characteristic examples of the meeting of Classic and Gothic modes of building, in the combined column and buttress forms of the exterior of the chevet of the church, and to historians as the sepulchre of certain of the Plantagenet kings and queens—Henry II., Richard I.; Eleanor of Guenne, the wife of Henry II., and Isabel of Angoulême, who married King John. The effigies of the three first named "are of colossal size, hewn out of the tufa rock, and painted. The last, and perhaps the best of the four as a work of art, is of smaller size and carved in wood, which has also been coloured."

From Fontevrault the author takes us to Loches, where he gives a vivid description of the remarkable château, with its three main gradations of style—the wide mullioned windows of the Louis XII. wing, the small windows and repeated round turrets of Charles VII., and the vast and frowning keep which leaves the strongest impression of all on the minds of most visitors. Mr. Cook says:—

"We looked up from beneath at the four great walls or rather cliffs of stone which formed the keep, where traces of four stories were still visible, reached by stairs cut in the thickness of the wall, and capable of containing 1,200 men. The question of

supplies was settled by a dark and unwholesome-looking hole sinking into the bowels of the earth, through which the food for the garrison was raised. The whole had evidently been built more with a view to durability and strength of resistance than elegance or grace; a relic of the older days, which was almost deserted by the time Francis I. had metamorphosed the feudal castles of Touraine into so many royal hunting-seats."

Perhaps there is no example more striking than Loches of the manner in which, in past times at all events, architectural changes have given the outward expression of social changes. There is an absolute savagery about the old keep which is eloquent of violent and tyrannous times. All of the misery that has been suffered and the cruelty perpetrated within those grim walls we shall never know now, but the author quotes enough of what is known to add an even more sinister interest to the place than its architectural expression suggests.

Mr. Cook quotes Langeais as forming a kind of connecting link between the Mediæval fortress and the Early Renaissance château. Externally it is entirely Mediæval in appearance, with its great round towers with their conical roofs, and the ponderous machicolation carried all round; internally, towards what we may now call the garden side, there is a cornice. "The problem which its architect had to solve was to combine a stronghold capable of defence with a house calculated for the increasing necessities of daily life." In plan the castle is in shape of an L with an obtuse instead of a right angle, the short leg of the L being separated from the range of rooms in the longer portion, and reached by a separate staircase. Much interesting history is told of Langeais and its various owners, and one is glad to read that at the present day it is in the hands of an owner (M. Siefried) who thoroughly appreciates the historic and architectural interest of the building; "no ancient castle," says Mr. Cook, "could possess a better châtelein; all its old beauties are preserved, and the necessities of a more complex modern life are introduced with a care and an artistic feeling that leave no sense of incongruity or incompleteness." The view of the château from its interior or garden side, introduced in the book, showing the present state in which it is kept, completely bears out this description.

Chaumont and Chenonceaux occupy the rest of the first volume and a portion of the second. Nothing in the exterior of French châteaux is more picturesque than the view of Chenonceaux looking along the river, with its groups of pointed roofs and turrets and chimneys on the bank, and the long galleries stretching on arches across the river (the Cher); nor can we agree with the author in thinking this (the work of Catherine de Medicis) "the least happy of the additions to the original château"; on the contrary, there is an architectural boldness in the idea which is very impressive, and the effect of building in this way is so picturesque in itself that even the dullest architecture would look interesting when built on an arcade over water. With Chenonceaux is connected the name of the gracious and lovely Diane de Poitiers, and of Catherine de Medicis and her brilliant fêtes, and in later times of Dupin, the friend of Montesquieu, when it became a centre for literary celebrities. The château seems to have had a tendency to get its owners into debt, and now the Crédit Foncier have it, and charge a franc for admission to (in our author's words) "this home of beautiful women and gigantic debts."

Of the more sinister records of Amboise and Blois there is a good account given in the chapters devoted to those famous châteaux. Mr. Cook refers to a remark of Balzac's, which we do not remember, to the effect that later generations would know nothing of Blois except from his pages, so decayed was the place in his day. The "conscientious restorer" has at any rate saved the building materially, if he has injured it in other respects,—

"But at Blois no change, no renovation, can check the rush of memories that press upon the

* "Old Touraine: the Life and History of the Famous Châteaux of France." By Theodore Andrea Cook, B.A. London: Percival & Co. 1892.

traveller directly he has crossed the threshold beneath the statue of the good King Louis, for the three-fold fashion of the architecture around him speaks eloquently of the three great ages through which the life of the castle has passed. The early years when the Orleans Princes were educated here, and Valentine Visconti mourned her murdered husband; the terrible days of the sixteenth century, when Guiso was murdered above the exquisite carvings of the central staircase; finally, the decaying glories of Gaston and his daughter, fitly framed in the ruled lines and spaces of the frigid building opposite the entrance.

The author is enthusiastic on the celebrated staircase, but he had better have left out his introduction of the spiral sea-shell and his suggestion of a suggestion from it. This is akin to the heresy of the Gothic vault and branching trees. However architecture may go to nature for some of its carved detail, Mr. Cook may be assured that constructive architecture and constructing architects have nothing to do with imitations of natural form, nor is there the slightest necessity for seeking such an origin for such a construction as the spiral staircase at Blois. Given the problem of constructing a spiral staircase under certain conditions of architectural style (consequently with certain forms of moulding, &c.), and of doing all in masonry in the most compact and scientific manner; given a clever master-mason ambitious to do the thing as well as possible for his own honour and *l'oude* in a building of exceptionally sumptuous character, and where there was no limit as to funds,—give these conditions, and the staircase will be evolved as the natural result of the constructive and architectural conditions, and there is no need to run after spiral sea-shells for it. It is only the ordinary winding staircase treated with an elaborate system of mouldings and ornament, and carried out with exceptional care. The spiral line of the mouldings follows from the necessary line formed by the steps. The public are so prone to take up these sentimental ideas about imitation of nature, that it is vexatious to meet with them in a book likely to be popular; and if the book comes to a second edition we hope the author will strike out this passage and his unnecessary shell illustrations.

Of the great tragedy of Blois, the assassination of the Duke of Guise, the author gives a careful and very vivid account, accompanied by a plan of the portion of the palace in which it occurred, and on which we can follow out in imagination the whole action, the movements of the victim and his assassins. There is an interesting chapter about Chamford, which the author happily observes is a parody of a Medieval building, just as *Rahelais*' "Thelema" was a parody of Medieval monasticism. Chamford has had a strange and varied history, and been dreadfully knocked about at different times, finally having been garrisoned by the French and taken by the Germans in the 1870 war. The author says, "our last, and perhaps most satisfactory,* visit was to the forest of masonry on the roof. Chimneys had expanded into monuments and lanterns into mausoleums, yet none of the grace with which the chimneys are treated at Azay or Chenonceaux is visible; nothing strikes the onlooker but a massiveness without much object, in which any beauty of detail is only thrown away." In our review of Architecture at the French Salon this year we noticed a large drawing for the restoration of one of these mammoth erections on the roof of the chateau of Chamford, and remarked on the futility of the squares and diamonds of black (slate, Mr. Cook tells us) let into the walls as ornament.

The beautiful chateau of Azay-la-Rideau is dismissed in a rather short though sympathetic chapter; we may refer the reader to a long account of it given in the *Builder* for March 30, 1889 (written by a French contributor). But as a whole this is a charming book, comprising a great deal of information within a small space, and written in an eloquent and picturesque literary style. We recommend it to the notice of those who are

about to visit the châteaux of Old Touraine, whether for sketching or only for inspection. As we have said, it will teach architects nothing about the architecture, but it will give them a far greater interest in the history and associations of the buildings, a side of the matter which sketching architects (especially of the younger generation) are rather too apt to pass over.

NOTES.

THE General Election has shown very noticeably the need in the villages of rural England of village halls wherein political meetings can be held, and at other times entertainments and classes. Without such village halls it is almost impossible for the rural voter to receive a political education, for it is becoming more and more obvious that it is not only immediately before an election, but during the general life of a Parliament, that the member, or even the possible candidate, must address the voters of a locality upon the subjects of current political interest. School-rooms are not infrequently used for the purpose, but there is no question that such use is inconvenient, and is also detrimental to the school fittings. It is a question well worthy of consideration, whether the County Councils might not give grants in aid of village halls out of the money now in their hands, which is often thrown away on very amateurish teaching of cookery and so-called technical education. Before technical education can really take a hold of localities there must be a place wherein it may be taught, and village halls would supply this want.

THE decoration of the outer lobby of the Guildhall Council-chamber has recently been completed, at the expense of Mr. Alderman Knill, as a memento of the year he served the office of Sheriff of London (1889-90), and "as a mark of his affection and reverence for the ancient Corporation of London, and for those illustrious Guilds which from the earliest times have worked together so harmoniously." This method of expression of goodwill is commendable, and suggestive of the times when art was a moral force than it is at present. The outer lobby is a small one, and has but one,—the east,—wall with unbroken surface; these walls are stuccoed, and have the lines representing stone joints. These lines are left, and somewhat disfigure the paintings which have been added. The east wall has the City arms, with red crossed shield and the red sword of St. Paul, the patron of the Cathedral, thereon, and the dragon's wing above. Two dragons of tame deportment support the shield, and beneath appears the well-known motto, "Domine dirige nos." The whole subject is surrounded by a conventionally-treated rose-tree, forming a border on three sides, with the arms of the twelve great Livery Companies. In the space on the adjoining north wall St. George is represented slaying the dragon without the City gates, whilst the citizens and their mayor watch with interest the result of the combat from a safe position on the City walls. A motto runs at the bottom of this and the east wall, "Our ancient word of courage, Fair St. George inspire us with the spleen of fiery dragons." It is unfortunate that the latter part comes so near the motto on the City arms, "Domine dirige nos." "Inspire us with the spleen of fiery dragons" is not what is intended, but so it reads. The subject on the north wall beyond the door is the most successful of all, and represents Old St. Paul's before the Great Fire, and this has been copied from a drawing in the possession of the Corporation. In front, St. Paul stands with his sword of martyrdom; around are heraldic words: "The Shield of Faith," "The Helmet of Salvation," and "The Sword of the Spirit," and an inscription below, "Put on the whole armour of God." The west wall is occupied by a

female figure representing the Maiden City, protected by her dragons, and around her are representations of some of the old City gates: Aldersgate, Cripplegate, Moorgate, Bishopsgate, Aldgate, Bridegate, Ludgate, and Newgate. The south wall is occupied by a three-stemmed oak-tree, with conventionally-treated branches and foliage, supporting some of the arms of the seventy-seven Livery Companies. We are informed that the cartoons were prepared by Mr. Powell, and the work executed by Mr. J. A. Pippet, of Solihull. The prevailing colours are red and grey, with occasional use of blue and gold, and the tone of colour being kept low, the result is not unpleasing as a whole. With reference to the design, there is at times some room for improvement, and the drawing is distinctly tame in some instances.

THE case of *Tullis v. Jackson*, decided last week by Mr. Justice Chitty, settles a point in regard to the certificates of architects which has previously not been judicially decided. By a clause in a contract between the builder and his employers, it was provided that the architect's certificate was not only to be final and binding, but should not be set aside, or be attempted to be set aside, by reason of any technical or legal defects, or for any pretence, suggestion, charge, or insinuation of fraud, collusion, or confederacy. It is a rule of law that an architect's certificate, though generally binding, is not final if fraudulent, and it was contended in the present case, on behalf of the builders, that such a clause was contrary to public policy. But Mr. Justice Chitty decided that if parties with their eyes open agreed to such a contract, the Court would not set it aside. It is only fair to the architect to observe, by the way, that no fraud was proved, and that the question was decided on the preliminary legal point, the actual facts not being gone into. This decision is in accordance with common sense. If a person of sound mind and understanding binds himself by such a clause, clearly no court of law should release him from a contract because it turns out not to suit him. On the other hand, such a clause seems to be one which a sensible man should not agree to. It is one thing to stipulate that a fair and *bona-fide* certificate, however erroneous, shall bind the parties: it is quite another to agree that an unfair and a fraudulent document shall have the same effect. The honest man, in such a case, delivers himself bound into the hands of rogues, if other parties should prove to be such. The clause, in fact, goes further than a desire to avoid expense, and litigation should carry parties to a contract. But this does not invalidate its binding force when actually signed and witnessed.

THE difficulties to which railway companies are put when it is necessary to enlarge important terminal stations, is well exemplified at the present time at Euston. A new western platform was opened on the first of the present month, and it was not so very long ago that a local platform, close to the arrival platform, was begun to be used. But there is no straight and easy means of communication between these new divergent sides of the terminus, and the main entrance and central hall are of no use for the western platform, or the local platform. The result is that Euston is now one of the most inconvenient stations in England, and appears likely to become worse. It is obvious that some large and bold scheme will in no long time have to be undertaken, by which the business at the terminus can be carried on with convenience to the public and to the service of the Company. The increased space for the dispatch of the passenger trains has only been gained at the expense of the convenience of the public.

GRAY'S INN CHAPEL, which the Benchers have decided to replace with the new building to which we adverted in a "Note" last week, stands, it is generally

* Should this be "unsatisfactory"? The context seems rather to require it.

believed, upon the site of the ancient religious structure cited in the royal licence granted to John de Crey (1315) for assigning certain lands and rent in St. Andrew's Holborn parish, and in Kentish-town, to St. Bartholomew's the Great, West Smithfield, for a chaplain to hold divine service in the chapel of his manor of "Pountepole" for the soul of the said John.* It seems that the chapel building assumed its present condition and size (51 ft. by 37 ft.) in the last ten years of the seventeenth century. In 1699 it was "beautified and repaired, the walls being covered with a handsome finishing," writes Hatton. A new porch and smaller turret were added in 1826, when, at the hands of, we believe, William Wigg, architect, various ill-advised alterations were made of the hall exterior, including the covering of the whole with cement, which later is now being removed.† The north side has been reinstated, and its stone-work repaired. The hell is inscribed, "James Bartlet made mee, 1689. Samuel Buck, Treasurer." Of the windows mentioned in the advertisement, the eastern one, of five lights, contains armorial bearings of Juxon, Sheldon, and Wake, Archbishops of Canterbury; and of King, Creve, and Morley, Bishops of Rochester, Durham, and Winchester; in 1862 the late Samuel Turner, bencher, presented three others. Some of the old heraldisically painted glass, of the fifteenth and sixteenth centuries, described by Dugdale, has been removed from the chapel to the hall. We understand that the present chapel will be taken for increasing the accommodation of the hall and combination-room. The corrugated iron building, which now sadly disfigures the Inn-garden, is for occasional use as a students' class-room; its erection scared away all the rooks at their nesting time, and the hirls have shown no disposition to return.

WE may draw attention to the fact that an International Exhibition of building materials is to be held this year at Lemberg, under the auspices of the Governor of Galicia. It will be opened on August 30 and closed on September 20 of this year. The exhibition will comprise all materials that are in any way connected with architecture and building. We fear this frequency of building exhibitions is not very popular with the best makers and dealers, as they gain little or nothing to compensate for the expense of exhibiting, and yet are liable to be looked on as declining in reputation if they fail to put in an appearance. However, any firms in this country which are desirous of exhibiting should communicate with Mr. A. Gobiet, Karolinenthal, Prague.

THE committee of architects elected to arrange the German Architectural Division at the Chicago Exhibition are working energetically, and mean to obtain a good collection of the work done during the last decade. Exhibitors incur no expenses except for the transmission of their drawings or models to the central office at Berlin. The Government has voted ample means for the carriage to America and back, the insurance, and all incidental charges. A jury of the seniors of the profession will decide as to the propriety of sending certain of the drawings, which will have to be ready in December and duly registered this month. Some two hundred of Germany's most interesting buildings are apparently to be illustrated separately, with the purpose of giving the visitors to the Exhibition an idea of the various classes of structures lately built; the architects of these two hundred buildings which have been selected by the jury have received special invitations to send in the necessary drawings. The German Architectural Collection is to be arranged according to system, and it is to be ready on the opening day of the Show.

* See "Gray's Inn: Its History, &c." By Mr. W. Ralph Douthwaite, Librarian. London: 1838.
† See our "Note" of October 31 last, and correspondence in our columns of that month.

IN regard to open spaces in and around London, various projects to which, in their initial stages, we have already adverted are making good progress. The Court of Common Council have voted 500*l.* to complete the purchase of West Wickham Common, 25 acres (see our "Note" of March 19 last), the property of Sir John Lennard, Bart., lord of the manor, and agreed to maintain it as an open space. A few days since the old burial-ground in Hackney-road, near St. Leonard's Church, Shoreditch, was devoted to the use of the public,—*e curis* the Earl of Meath's Association. A sum of 8,000*l.* is all that is now needed to secure the ground (21 acres) at Maida-vale, since the Marylebone and Paddington Vestries have voted grants of 5,000*l.* and 25,000*l.* respectively, and 11,000*l.* are privately subscribed by the parishioners towards the necessary total of 50,000*l.*, which should be forthcoming before the close of the year. Mr. Joseph Guedalla and Mr. Harben have, it is stated, conditionally promised to double their previous donations of 500*l.* each. This area, held, we believe, by the Ecclesiastical Commissioners, was opened as a recreation-ground on April 28, 1888, mainly through the exertions of Mr. Beachcroft, L.C.C., who has since taken a most active part in endeavouring to assure its permanent appropriation to the public benefit. The London County Council have in effect agreed to pay 4,250*l.*, a contribution promised by the late Metropolitan Board of Works, to the purchase, for 9,200*l.* by the Kensington Vestry, of Adam's Field, in Pottery-lane, Notting Hill (the *Builder*, October 10, and December 22, 1888). This land, about $\frac{1}{2}$ acres, was bought by the Vestry three years ago, the Charity Commissioners, as we read at the time, giving 2,000*l.* It has since been named Avondale Park. As regards the Lewisham Hilly Fields, over 40 acres (see the *Builder*, March 5 last), the committee ask for a little more than 3,000*l.* to balance an estimated total of 41,850*l.* Towards that sum promises are already made of 16,650*l.*, comprising 1,000*l.* from the City Parochial Charities Fund, 500*l.* by the Goldsmiths' Company, 100 guineas apiece by the Leathersellers' and the Fishmongers', 100*l.* apiece by the Grocers' and the Clothworkers', and 100*l.* by the Skinners', Drapers', and Mercers' Companies jointly. The County Council will contribute 22,000*l.*, and, as soon as the purchase-moneys are thus provided, will, it is stated, endeavour to conclude the sale at the estimated amount. At their last monthly meeting the Metropolitan Public Gardens Association resolved to move for the opening of Vincent-square (10 acres, set apart in 1810 by Dean Vincent as the Westminster boys' playfields); Soho-square; and the Eton and Middlesex (late) cricket-ground, Primrose-hill; and to lay out a plot in Marigold-street, S.E., lately given to them.

IT is truly sad to hear that, in consequence of differences between the lord of the manor and the neighbouring population in regard to some rights of way, the remains of Whithy Abbey have been closed to the public, and archaeologists, architects, and artists, are thus shut out for the present from visiting a place of unusually historic interest and picturesque character. A correspondent of the *Daily News* (July 2), in directing attention to recent differences between the inhabitants and the manor-lord of Whithy, asks for contributions in aid of testing by law the right of the latter to exclude them from the Abbey, and deprive them of their ancient enjoyment. Standing at what was Streanshalh, upon the Eske's east bank, the ruins of the church are the sole remains of "high Whithy's cloister'd pile," founded in 658, by Oswy, king of Northumbria, after his victory over Penda at Leeds, and dedicated to St. Peter, for Hilda, Abbess of a convent on the Wear.* Cedmon, author of the "Paraphrase," was a lay brother here in St. Hilda's time.

* She was King Edwin's niece. Oswy is said to have taken as his model York Minster, as rebuilt of stone, circa 635.

Destroyed circa 867 by the Danes, whose camp gave a name to Raven's-hill, hard by, the monastery was given by the Conqueror to Hugh, Earl of Chester, who bestowed it upon William De Percy. De Percy, as some authorities say, but, according to others, Reinfrid, a monk of Evesham, who had been one of William's followers, restored the vacant house as a priory. Henry I. largely endowed the priory, converting it into a Cistercian abbey,—one of the eight after that kind in Yorkshire,—for nuns and monks Benedictine, with precedence, as before, to the abhess. In 1175 Whithy again suffered pillage, at the hands of some Norwegian marauders, but so far recovered as ultimately to enjoy a net income of 437*l.* 2*s.*, *teste* Dugdale, at its surrender. In 1555 the monastery was bought by Sir Richard Cholmley, whose son, twenty-five years later, built the adjoining Whithy Hall, with, it is said, the materials of the monastic buildings. The oldest part of the church is its Early English choir, erected by Richard, formerly of St. Peter at Burgh, abbot, 1148-75; the remaining transept (north) is later, and most of the nave, whose west side fell down in 1763, is Decorated. The central tower, 106 ft. high, came to the ground on June 25, 1830. The church's dimensions are thus given in L. Charlton's book (York, 1779, 4to): length, 300 ft.; breadth, 69 ft.; cross aisles, 150 ft.; height of nave, 60 ft.; and of tower, 150 ft. Captain Cook, the great navigator, first saw sea-service as a three-years' apprentice on board of a Whithy collier. It is to be hoped that the enclosure of Whithy is only temporary.

THE New York *Electrical World* gave recently an account of the state of the works that are being carried out for the utilisation of Niagara Falls as they existed at the commencement of the year, and also the proposed machinery which is to be installed later. The main tunnel, which will form the tail-race for the turbines, was begun in October, 1890, and is now intended to be finished shortly. It is 18 ft. 10 in. wide and 21 ft. high, and is brick-lined throughout. It has been driven from three points, namely, from the outlet below the Falls, and from two shafts, 260 ft. and 196 ft. deep respectively. The grade is $\frac{1}{4}$ per cent. The total capacity of the plant will be 100,000 horse-power; and this is proposed to be obtained from a series of turbines of 2,500 horse-power to 5,000 horse-power each. The turbines will be placed on the American side of the river, about a mile above the Falls, and part of the power is to be utilised in the immediate neighbourhood, mills being erected for the purpose. For transmission of power to a distance, either electricity or compressed air will be used; no wire rope transmission being contemplated. Each mill will have its own vertical shaft and turbine, with tail-race connected by a service tunnel to the main tunnel. The water will be conveyed to the turbine by a separate supply-pipe entering the turbine wheel from below, so as to balance the weight of the wheel and vertical shaft. The available head is 130 ft. At present plant for 15,000 horse-power is to be erected, some for driving air-compressors, and some for driving dynamos. The City of Buffalo is to be supplied with electricity generated by means of the power from the Falls. The pressure will probably be 10,000 volts on the line to Buffalo, but for distribution in the city it will be reduced to 1,000 volts. Even this is a high voltage, but personal safety is less carefully guarded in America than in this country, where people are not taught to look out for themselves to the same extent.

THE City Hall of Philadelphia, which forms so conspicuous a feature (too conspicuous!) at the crossing of the principal thoroughfares of the city, has a central tower which, when completed, will be 500 ft. high. The top is to be ironwork, the rest being of white marble. About 100,000 square feet of the ironwork are to be plated

with aluminium. The Tacony Iron and Metal Company of Philadelphia have recently succeeded in the electro-plating of the 6-ton cast-iron columns, 20 ft. high, which form part of the design. The process is as follows:—The castings to be plated are first soaked for a day in caustic soda to remove grease, and they are then pickled in acid for another day to remove scale and rust. The parts are then thoroughly cleaned with steel brushes, after which they are ready for plating. A heavy coating of copper is first applied, and on the top of this is deposited the aluminium to a thickness of a sixteenth of an inch. About forty-two tons of the metal will be required to complete the plating of the iron.

THE ARCHITECTURAL ASSOCIATION'S VISIT TO ELTHAM.

ON Saturday last a large number of members of the Association went down to Eltham, attracted by the visit which had been arranged to Colonel North's residence at Avery Hill.

The party first of all made a visit to the remains of the old Palace of Eltham.

This grand ancient structure has much of historical interest. As early as 1270 it was used by Henry III.; it was enlarged about the close of the thirteenth century by Anthony Bick, Bishop of Durham, and then became the residence of Edward II. Here his son was born, from this circumstance called John of Eltham, and the palace, erroneously, King John's Palace. Edward III. held Parliaments here in 1329 and 1375, and in 1364 sumptuously entertained his prisoner, King John of France. The festival of Christmas was here celebrated by Richard II. in 1384 and 1386, and by Henry IV. in 1405. Edward IV. repaired the palace and enclosed one of the parks, and Henry VII. built a front to it and otherwise improved it, and it continued to be the occasional royal residence during the reign of Henry VIII., who celebrated two splendid festivals in it, after which time it began to yield in importance to Greenwich, which in the reign of Elizabeth obtained the ascendancy.

During the Civil War in the reign of Charles I., Eltham was occupied by the Earl of Essex, the Parliamentary general, who died here in 1648. Of the extent of this once magnificent pile some idea may be formed by the Parliamentary survey, in which it is described as having "one fair chapel, one great hall, forty-six rooms, and offices below stairs, with two large cellars; and above stairs, seventeen lodging rooms on the King's side, twelve on the Queen's side, and nine on the Prince's side, thirty-five Hayes of buildings, or seventy-eight rooms in the offices round the courtyard, which contained one acre of ground." Of these, the chief part remaining is the great hall, 100 ft. long and 36 ft. wide, having ten windows on each side, and one of the finest examples of hammer-beam roofs in the country. The hall was, for many years, used as a barn, but has been repaired and shored up for preservation. There are also the ancient stone bridge, portions of the walls and subterranean passages, and parts of the interior offices converted into modern buildings, and, with the surrounding lands, constituting what is called Court Farm. The area is enclosed by a stone wall of great thickness, with additions of brick, probably made in the time of Henry VII., and from 18 to 20 ft. in height. The moat by which it was surrounded was from 70 ft. to 80 ft. in breadth, and from 14 ft. to 15 ft. in depth. It is quite dry, and, though converted into a garden, its original form may be distinctly traced. A very fine collection of roses in the moat-garden was seen by the visitors, who appreciated the horticulture as well as the architecture. Mr. Edmund Woodhouse, M.A., who acted as secretary for the visit, read in the hall a short account of the chief historical events relating to the palace, and excited the imagination of his hearers to recall the aspect of Eltham in his glory.

Leaving the Palace, the party proceeded through Eltham and along the Bexley-road till they reached Avery Hill, where they came upon the residence, which has been so much talked about, both from the well-known name of its owner, Colonel North, and from the *cause célèbre* furnished by the disagreements of that gentleman and his architect. The general character of the house is more remarkable

for the large sums of money expended, than for high artistic results. It is perfectly evident throughout the work that the designers, both architect and others, have not had sufficient time for giving that thought which the expenditure of large sums of money in a comparatively limited area necessitates, if vulgarity is to be avoided. On the one hand, homeliness, quiet, and refinement have been lost, while magnificence and splendour have not been attained to a degree commensurate with the large expenditure of money. Beautiful materials, and in many cases beautiful workmanship, are lavishly displayed throughout the house, the Mexican onyx, for example, being probably some of the finest specimens of that marble to be seen in the world. The most characteristic features of the house are the conservatories, both for flowers and ferns, the winter garden, and the picture gallery. The conservatories and winter garden are of large size, the latter being 100 ft. by 100 ft., and are admirably arranged, and planted to provide as near an approximation to constant open-air life as our climate will permit. The picture gallery is known by repute to most of our readers, and is one of the few places where it is possible for a private individual to own and display the enormous canvases in which some of the modern Italian painters delight. A very pleasant luxury is the Turkish bath adjoining the owner's bedroom, fitted up in a suitable fashion with faience of a Moresco character of design. The stables are naturally one of the most satisfactory parts of the whole, as while everything is of the very best, there does not appear that extravagance which detracts from one's enjoyment of the house itself. The engine and boiler house, with the electric lighting machinery, also interested many of the members. Colonel North met the party, and conducted them through the house, pointing out the special features, and entertaining the visitors with some racy stories and remarks. The views from the upper windows were especially admired, and are, indeed, remarkable for a house only nine miles from London.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

CONTINUING our digest of the proceedings of this Commission,* we may conveniently state the broad features of the bulk of the evidence taken at the later sittings. Passing away for a time from questions of population and supply per head, the Commission have taken up that of the pollution of the Thames and of the Lea. The question divides itself into two problems. The first relates to the actual character and amount of visible and material pollution and the possibility of reducing it. The second relates to the effect of that pollution upon the water as determined by analyses, by experience as to the spread of diseases attributed to polluted water, and by scientific research as to the vitality of disease germs and the efficiency of sewage treatment and filtration in getting rid of them. The last stated branch of the inquiry is complicated by the suggestion that the use of chemicals in the treatment of sewage may injure the quality of the water which receives the effluent. Positive evidence as to material pollution has been given by Dr. Ashby, after inspecting the Thames and its tributaries below Oxford; by Dr. Foshrook, after going over the Thames and its tributaries above Oxford; and by Dr. Geo. Turner, after examining the Lea and its tributaries. Scientific evidence was first given by Mr. C. E. Groves, Consulting Chemist to the Thames Conservancy. It was given incidentally by Dr. Ashby and Dr. Foshrook, and directly by Dr. Frankland, the Water Examiner; Mr. Shirley F. Murphy, Medical Officer of Health to the London County Council; and Mr. W. J. Dibdin, the Chemist to the Council. Mr. Murphy deals with deductions from statistics of mortality, and Mr. Dibdin with an enormous number of analyses, the mere statistical tabulation of which occupies some sixty foolscap pages. In addition to all this evidence, the Commission has received a preliminary report from the Royal Society, which has been conducting an inquiry into the bacteriology of water at the instance of the London County Council, who are to bear one-half the cost; and a further report from the Royal Society is expected in October. On account of this inquiry by the Royal Society, the Commission

* See last volume of the *Builder*, pp. 418, 433, 456, 480, 503; and current volume, pp. 19, 23.

have refrained from conducting a similar inquiry on their own account.

These facts came out in a conversation with Mr. W. H. Dickinson, Deputy-Chairman of the London County Council, when he attended the Commission to present the statement and resolutions of the Council, which have been already published in full in the *Builder**. In reply to questions, he said that the Council ought to provide for all those generations of ratepayers who will be paying their share of any capital expenditure incurred. It was possible that a municipal authority might do more than a company to prevent waste, but at the same time it would have to meet a heavier demand for free fountains, and the public use of water. The question of quality had been before the Water Committee of the Council, but they concluded that they ought not to make any reference to it in their statement, because such antagonistic views were laid before them as to the quality of the water of both the Thames and the Lea that it was impossible for them to come to any definite conclusion; they felt that it must be left to be thrashed out by the Commission. They knew that considerable pollution was received by the rivers, and, before resolving that water should continue to be taken from them, they felt they ought to be satisfied that the pollution could be rendered perfectly harmless.

Sir Thomas Farrer, as ex-chairman of the Water Committee, also presented himself before the Commission. He said that one fact had come out which was not at first patent to the Water Committee, and that was the enormous demand made by the populations of Hertfordshire, Buckinghamshire, and Surrey, for the water which had hitherto formed a part of the supply of London, so that those populations would resist further appropriations for London unless they shared in the supply. He was permanent secretary at the Board of Trade when the Conservancy took charge of the Upper Thames, and it was with him a matter of doubt whether the large payments made by the companies did not go towards maintaining the upper navigation rather than providing a water supply for London.

Mr. G. J. Symons, F.R.S., who has made a special study of rainfall, was examined upon a statement he had made upon that subject. He stated that the area of the watershed of the Thames above the intakes of the water companies was 3,542 sq. miles; the mean rainfall was 28.5 in.; for 975 sq. miles it was 32 in.; for 2,345 sq. miles it was 27.5 in.; for 222 sq. miles it was 24 in. The area of the Lea above the intakes was 497 sq. miles; the mean rainfall was 26 in.; 350 sq. miles had a mean rainfall of 27 in.; and 147 sq. miles had a mean rainfall of 24 in. The figures as to the Thames embody the results of many thousands of observations, extending over many years. The driest year of the series, 1854, yielded 68 per cent. of the mean ratio.

It is convenient in our digest to keep the evidence of facts distinct from scientific deductions and opinions, and we, therefore, eliminate the latter from the evidence descriptive of pollutions.

Pollutions of the Lower Thames.

We have already given a summary of the report of Dr. Ashby upon the pollutions of the Thames from the intakes of the Companies up to Oxford, with many typical examples. Examined upon his statement, Dr. Ashby said that the effluent of Uxbridge was discharged under water at West Drayton. The effluent, even when diluted with the Colne water, was very offensive. It was quite impossible to get the effluent unmixd with the Colne water, and the mixture was very offensive. The effluent from Oxford was very foul and stinking, and the bed of the stream was very bad indeed. There were heaps of sludge where there was an opportunity of sewage matter running off the land into the stream. He had often found large deposits of offensive sludge from village sewers in ditches leading to a stream. Sometimes they would be washed away only when there was a fall of rain. These deposits gave an opportunity for disease organisms to breed in them. Of trade pollutions he thought taneries and fellmongers' yards were the most dangerous. The discharges from them were often exceedingly offensive, and contained highly polluting organic matter. There was danger in effluents from all sewage farms. A town

* See *Builder* for July 2, pp. 15 and 16.

should do the best it can to prevent the fouling of a river, but it ought to have the right to send its purified sewage into it. Asked about Marlborough and its college, Dr. Ashby said the whole of Marlborough drained into the river, which, when he saw it, was in an abominable state. The rates were low, and there was no sewerage rate; and it was said that the death rate was very low too. What was done in many places was often the best for the health of the district, although it might be a contravention of the Rivers Pollution Act, which was more or less of a dead letter. We could not go back and keep all pollutions out of the Thames, and, with so many chances of pollution, it must be a more or less dangerous source of supply. It ought to be purified to such an extent that its proper use as a pleasure resort should not be interfered with, and, although much had been done to improve it, it is an undesirable and unsafe source of supply.

Pollutions of the Upper Thames.

Dr. Geo. Haynes Fosbroke, Medical Officer of Health for the County of Worcester, in his statement said that he had made a special study of the subject of water supply, and at the request of the London County Council he had examined the Thames and its tributaries above Oxford, including the river Cherwell. In this examination he had traversed 400 miles. He had ignored small watercourses, unless they contained impurities derived from towns or villages of importance. He submitted two maps of the Thames basin, and, by means of a number for each source of pollution, he referred to a voluminous appendix, setting out more details than could be embodied in the statement. The only places of any size passed by the Thames itself are Cricklade and Lechlade. The following are named as the tributaries of the Thames, their length exclusive of sinosities, the places where they are received by the Thames, and the principal towns and villages they pass. The Cherwell is included by request of the County Council, although it falls into the Thames just below Oxford. On the north side are:

The Churn, about 20 miles, received just below Cricklade.—Cubberley, Coleshorne, Rendcombe, Cirencester and South Cerney.

Ampnay Brooks, 19 miles, near Castle Eaton,—Polton, Marston Meysay and Ampney Crucis.

The Colne, 27 miles, near the Round House above Lechlade.—Andoversford, Wittington, Colne St. Denis, Bibury, Queenington and Fairford.

The Leach, 18 miles, just below Lechlade.—North Leach, East Leach and Southrop.

The Bampton Brooks, in the district of Tadpole Bridge,—Bampton (1,300)—include the following four streams,—

The Windrush, 31 miles, at New Bridge,—Naunton, Bourton-on-the-Water, Burford and Witney.

The Ewerdale, 22 miles, near to Cassington,—Moreton-in-the-Marsh, Kingham, Chipping Norton, Shipton, Ascot, Charlbury, Handborough and Woodstock.

The Glyme, 7 miles, and the Durne, 8 miles.

The Cherwell, 35 miles, immediately below Oxford.—Crokerdy, Banbury, Kings Sutton, Heyford, Islip and Bicester. This receives,—

The Ray, 14 miles, at Islip.

On the south side are,—

The Ray, 10 miles, at Castle Eaton,—Swindon.

The Highbrook streams, above Lechlade,—Highworth.

The Cole, 12 miles, just below Lechlade,—Shrivenham and Coleshill.

The area of this watershed of the upper Thames is 1,222 sq. miles, including 347 of the Cherwell basin. The population, in eight counties, was, approximately, 1,97,036 in 1881. In describing the geology of the basin Dr. Fosbroke mentions the area,—300 sq. miles,—and the varying thicknesses of the porous oolite formations, because much domestic sewage is disposed of by being cast on to the soil, which, being so spongy, absorbs it with avidity. A large portion of the rainfall of the oolite and forest marble formations descends to the valleys, and the accumulation is brought to the surface by means of geological faults which form large and never-ceasing springs at Boxwell, Ewen, Ampney, Bibury, Abington, and Winslow, and intermittent springs at Winterwell, Thames Head, and Trewsbury Quarry (called also Thames Head). An engine at Trewsbury supplies the Thames

and Severn Canal. In the driest summer the engine has never been able to exhaust the water. For many months the engine has thrown up 2,880,000 gallons daily, at a temperature of 50 degs. F., which is said never to vary. The dry weather or perennial flow of the Thames is spring water. There are no lakes or large marshes to store up flood waters of excessive rains. The Thames and Severn Canal forms a junction with the Thames at Lechlade; the North Wilts Canal with the Cherwell at Blethington. Referring for details to a voluminous appendix, Dr. Fosbroke proceeds to deal with:

I. Sewage pollutions.—(1) Town drainage, (2) village drainage, (3) dwelling-houses, (4) house-boats. II. Flow from manured lands and cattle sheds. III. Sheep-washing. IV. Trade pollutions:—(1) Mills, (2) tanneries, (3) breweries, (4) barges, (5) slaughter-houses. V. Dead bodies of animals. He says:—“A considerable portion of the watersheds of the Thames and Cherwell is composed of geological formations, extremely porous, and specially adapted for the absorption of moisture. Owing to this property rain falls is not exposed to contamination; but when, as is so often the case, refuse of all kinds is allowed to waste away in cesspools, ditches, or over the surface, the ground becomes so impregnated with filth that it can no longer be regarded as a first-class collecting area for water destined for domestic use. The porous state of the oolite in Oxfordshire and Gloucestershire is utilised by the population of these districts as a means of sewage disposal. It is a common practice in many localities to pour domestic and trade refuse into the fissures (designated “mines” or “lissoms”) in order that it may easily be got rid of. The old adage “Out of sight, out of mind,” is particularly applicable to the sewage disposal of such towns as Woodstock, Northleach, and Stow-on-the-Wold, where efforts are made to tap the fissures so that filth may be dealt with without recourse to drains or sewers.

Some conception of the size and depth of the cracks in the rock will be formed when I say that a person residing at Northleach told me for years he never heeded what became of his privy refuse; it was enough to know that the vault, although in his house, never required cleansing. One day his child fell through the closet seat, and he then became curious as to what might have happened had not rescue been at hand, and on search he found, just below the closet, a chasm which he could not gauge, but down which the child might have been irretrievably lost. I visited many villages in Gloucestershire and Oxfordshire where there is no system of sewage disposal, and even house-drains are considered unnecessary, as the soil so readily absorbs any liquid refuse which may find its way on to it. In districts unaffected by river fluctuations this porous state of the soil is much prized, but in the alluvial areas this merit is not so highly esteemed, for it is found that the cesspools are materially influenced by the height of the streams. These few remarks will show to what an extent the rivers and springs in the Upper Thames Basin may be affected by polluting sources, which cursory observation would lead one to believe are unimportant. When sewage is poured into subterranean passages, such as I have described, it is manifest that should specific infection occur, the danger to those drinking the water is by no means mythical.

The towns of Swindon (New and Old), Banbury, Bicester, and Cirencester dispose of their sewage by broad irrigation of land. The sewage from the village of Wroughton is treated in the same way. The effluent from the Old and New Swindon (particularly the latter) and Banbury farms seriously pollute the adjacent streams, and the same thing occasionally happens at Bicester. The Cirencester farm and the small one at Wroughton do not appear to do so,—at any rate, if they do, it cannot be often, as the land is well adapted for local requirements, and seems to be properly looked after. The town of Swindon is governed by the Old Swindon Local Board and the New Swindon Local Board, and the respective sewage farms are placed on the eastern bank of the river Ray, which joins the Thames just below Cricklade. The Old Swindon farm is nearer to the source of the stream than at New Swindon.

I found (March 8, 1891) that the river Ray showed signs of pollution immediately it received the effluent from the Old Swindon farm,

but that after the reception of that from the New Swindon farm, it became little, if any, better than an open sewer, and until it flowed into the Thames maintained this appearance. Below New Swindon the nuisance from the river and the farm has lately been so great as to cause considerable local agitation. At the point where the Ray joins the Thames, I noticed (March 5, 1891) the water from the former was much discoloured, and seemed to flow side by side with that from the latter for some considerable distance before mingling took place. Some idea of the serious import of this pollution will be formed when I say that it is estimated that there are about 6,000 water-closets in the town of Swindon, and that the population is increasing from year to year.

The Banbury sewage-farm is on the left bank of the Cherwell, and has a clayey subsoil. On the day of my visit (March 18, 1891), the effluent water, as it joined the river, was black and offensive, and discoloured the stream for a distance of some 120 yards. Dr. Dibdin, in reporting upon a sample I collected in the presence of the farm manager, speaks of it as “very turbid, yellow colour,” “quantity of black, earthy-looking deposit,” “sewage odour.”

Two years ago very large quantities of fish were destroyed by the discharge of sewage into the river, and in summer time, even now, the sewage is said to pollute the stream as far as Tywyrd Mill, about one and a-half miles from the town. The population of Banbury is estimated to be 12,700, and is believed to be increasing. Water-closets are in general use. The sewers receive surface water, and (I am informed by the Borough Surveyor) a considerable quantity of subsoil drainage also, and discharge their contents into tanks, whence the sewage is pumped to the farm after “screening.” In one part of the town the “separate system” is in vogue. In times of heavy rain the overflow sewage goes direct to the river.

The Bicester Sewage Farm deals with the sewage of a population estimated to be 3,600, and is placed on the left bank of the Oxfordshire Ray. The fields irrigated are meadow land close to the stream; indeed, one of the main “carriers” is so close to the water that rat-holes frequently lead sewage into it. It is indeed beyond the sordid condition of the effluent carrier that purification is not always complete, although on the day of my inspection (April 8, 1891), there was little to complain of. There are about 100 water-closets in the town.

The number of towns where attempts, more or less successful, have been made to treat the sewage by passing it through land before it is discharged into rivers, is small. Very many places are entirely unsewered; others have surface-drains which, when originally laid down, were intended for road-water only; but in course of time dwellings have been connected with them, and they now serve the additional purpose of carriers of house refuse. It is impossible to estimate the amount of the liquid which finds its way directly into the watercourses by these means, since much soaks away into the subsoil. Generally speaking, these surface-drains are unsuited for the reception of local refuse, so, as a rule, cesspools, connected with them by overflow pipes, have been constructed to intercept the solid matters.

The following places pollute the streams in this way:—Ashton-Keynes, Cricklade, Lechlade, Fairingdon, Fysham Village, South Cerney, Fairford, Northleach, Naunton, Bourton-on-the-Water, Great Barrington, Burford, Witney, Moreton-in-the-Marsh, Chipping Norton, Shipton, Charlbury, Woodstock, King’s Sutton, Highworth.

At Fairingdon the sewers are of irregular construction and convey the sewage and storm-water into the “sewer ditch” (a watercourse of considerable dimensions) which discharges into the River Thames just below Radcot Bridge, after a course of about four miles. As the ditch approaches the Thames it is said oftentimes to be very offensive, and a nuisance to those passing along the highway.

At Witney, the sewage is collected by surface-drains (of stone or pipes), and conveyed into a tank of small dimensions at the rear of Hudson’s Yard. The overflow from the tank discharges crude sewage into Gunn’s Hole ditch, which flows through Emma’s Dyke to the Windrush, after a course of about one and a-quarter mile. At the lower part of Emma’s Dyke, sewage fungus was obvious.

I desire to call attention to the result of the action, “The Thames Conservancy Board v. the

Witney Local Board, reported in the *Witney Express* of September 29, 1881, as it shows how difficult it is to prove pollution of streams. In this case chemical evidence was adduced to the effect that "the water of Emma's Dyke at its out-fall (one and a quarter mile below the sewage outlet) is as good, and, if anything, a little better than the water of the Windrush itself," and that "not the slightest injury is likely to arise from any particle of the Witney sewage reaching the Thames." In connexion with the pollution caused by Witney, that due to the blanket refuse should not be forgotten.

At Chipping Norton the sewage includes ordinary house refuse, and the whole of that from the Tweed Mills and a tannery; and it is discharged into the brook which flows a distance of about four and a half miles (exclusive of sinuosities) to join the Evenlode, just below the village of Kingham. At the Tweed Mills it is extremely foul, and nothing more than a common sewer. The addition of the dye refuse and gas-works drainage further pollute it. The day I inspected the stream (March 21, 1891) it was black and offensive. At a point some two and a half miles below Chipping Norton I noticed large volumes of deep dye refuse. The brook is much complained of, not only by the tenants of Churchhill and Kingham Mills, but also by a gentleman who resides at the Manor Farm, Ascot, some miles lower down the Evenlode. Apparently there are no fish. The polluted condition of this stream has been brought under the notice of the County Council of Oxfordshire, but no steps have yet been taken to remedy the evil. With regard to the pollutions designated "of minor importance," I wish it to be clearly understood that, although so described, I consider them objectionable where the river-water is ultimately used for domestic purposes. I have so classified them, because their extent is apparently small. In the course of my inspection I visited numbers of villages and dwelling-houses on the banks of the streams, which pollute in rainy seasons only, as the ditches store the filth, until scoured by storm water. It is impossible to estimate the number of such places, as they are legion. A "direct" sewage pollution, of which I have not yet spoken, is that caused by privies placed at the water's edge. At one time, I believe, it was a common occurrence for closets to empty into the stream; but, owing to the action of the local sanitary authorities, such a nuisance has been, in a great measure, abated. I did, however, notice some, scattered throughout the watersheds, constructed on this plan, and several others, whose uncemented vaults were in close proximity to watercourses. The total number of w.c.'s in the towns and villages adjacent to the streams I visited may roughly be computed to be between 8,000 and 9,000.

The pollution by the water which has passed over manured lands is very considerable, especially in times of heavy rain-fall. Some idea of its extent may be formed from the circumstance that, at the Wolvercot and Eynsham paper-mills, impounding reservoirs have been constructed to supply water during flood times, as that then available is too foul for trade purposes.

The following are approximate estimates of the proportionate amounts of arable and pasture land, and the number of live stock, in so much of each county as lies within the basin of the Upper Thames:—

County.	Arable Acres.	Pasture Acres.	Total Number of Arable and Pasture Acres.
Glooucester	18,463	49,730	178,199
Oxford	256,488	17,129	410,827
Wilts.	96,658	109,446	206,104
Bucks	110,567	142,785	253,352
Berks	224,374	151,984	376,358
Northampton	16,790	24,745	41,535
Warwick	8,240	14,609	22,849
Worcester	35	51	86
Total	771,642	717,815	1,489,457

On this area there are 60,164 horses, 219,758 cattle, 943,014 sheep, and 151,143 pigs.

From these statistics, it may fairly be concluded that the acreage of arable land somewhat exceeds that laid down as pasture; and for this reason the Thames basin is not as eligible a collecting area as if grass land predominated. At the outset I was inclined to accept this view, but as my inquiry proceeded, I became convinced that it was not of so much importance; inasmuch as I found that it is common custom in these counties to manure grass heavily. I do not think that human excrement is largely used for this purpose. In

addition to this, irrigation of the meadows adjacent to the streams is largely resorted to, and the consequence is that impurities find their way into the watercourses in considerable quantities. The agricultural returns just quoted show that no less than 1,374,079 horses, cattle, sheep, and pigs, were to be found in the counties of the Upper Thames and Cherwell last year. This vast number of animals in summer time frequent the meadow land adjacent to the watercourses, and, as almost every field in proximity to a stream has a cattle drinking-place, the pollutions furnished by them are considerable. Again, sheds in which the cattle are housed during winter are not uncommonly drained into the rivers. Bearing these facts in mind, and also that heavy rains scour large numbers of sewage-polluted ditches, permeate cesspools, and sweep over manured lands, it is not surprising to find that the flood-waters of the Upper Thames Basin are so discoloured and contaminated that they cannot be used even for trade purposes.

Another source of pollution to the smaller streams more particularly is sheep-washing. As this operation was going on at the time I visited some districts, its injurious effects were readily discernible. When in full swing, I understand it discolours the watercourses for long distances.

Trade Pollutions.—1. *Mills*: The mills are of four kinds: (a) corn, (b) paper, (c) blanket, (d) flock. (a) *Corn Mills*. There are no corn mills on the Thames below Cricklade, but many are to be found on the tributary streams. Although numerous, the number has decreased. This I understand is not so much due to the loss of water power as to agricultural influences, which tend to centre them round places where railway facilities are available. Corn mills, *per se*, do not pollute streams, but in most instances the slop-water, and occasionally privy refuse from the employes' dwellings are discharged into the water. I have, however, included them under "Sewage Pollutions." (b) *Paper Mills*.—There are only two paper mills in the Upper Thames Basin, one being at Wolvercot and the other at Eynsham. The latter has been closed for the past three months, but it seems probable that it will be re-opened after a time. (After describing the process of paper-making, he says:—) "The third refuse consists of the alkaline waste liquor, with all matters dissolved by it from the rags, straw, and esparto grass, and the water from the engine. When washing is complete, the pulp is bleached by means of chloride of lime. The bleaching-powder employed is heated with water in vats, and the insoluble lime is allowed to settle. This sediment is the fourth refuse of the paper maker; the clear bleach liquid is brought into contact with paper pulp and left so for some time. The bleaching process is one which if not carefully managed is likely to lead to great injury to streams, especially in the destruction of fish. The esparto washings, 'third bollings,' and liquid from the rolling-mills, are discharged into the stream, but the "first" and "second" esparto "hollings," which contain much caustic alkali, are passed into an "evaporator," by means of which a considerable quantity of the alkali is recovered. On the day of my visit (April 17, 1891) there was decided evidence of pollution, which, of course, would have been worse had not the "evaporator" been in use. Apparently the whole of the refuse not evaporated, or taking the form of sludge, reaches the river. There seems to be a local impression that the pollution from Eynsham Mill is less than formerly. (c) *Blanket Mills*.—The four mills which constitute the industry of blanket-making were met with in the neighbourhood of Witney. The processes giving rise to pollution in these trades are those of "scouring" and "dyeing." In the former, quantities of stale human urine, mingled with pig dung and soapsuds, are made use of. The refuse from two mills (New Mill and Crawley Mill) is discharged directly into the Windrush, but at Witney Mill, —the only manufactory in the district where dyeing is carried on,—the waste-water is received into tanks, and treated with ferricallum before it is poured into the river. At the fourth mill there are no waste products. The discharge of quantities of scouring water into the Windrush is had enough, but the addition of stale urine and pig-dung intensifies the evil. (d) *Flock Mill*.—When the Cirencester Mill is in full work, about 14 cwt. to 15 cwt. of rags of all descriptions are converted into "flock" per week, but the trade is intermittent. The pro-

cess consists in the washing of the rags and their subsequent reduction to "pulp." No chemicals are used. The water used in washing is drawn from and returned to the river without purification, consequently a considerable amount of filth must be passed into the Churn in this way.

2. *Tanneries*.—The tanning process may be considered under two heads,—(a) That of cleansing the skins and removing the hair, usually effected by the "Fellmongers"; (b) The subsequent exposure of the hides to the tanning principle. The hides treated by fellmongers are either English or foreign. The former are usually soaked in clean water for about twenty-four hours and then treated with lime; but the latter are immersed in "lime-pits" for about three weeks. Subsequently they are hung up to dry, and after the removal of the hair or wool, are known as "pelts," which are next soaked in the lime-pits and then handed over to the tanner.

The tanner dresses the hides with alnm, salt, dogs' or hen dung, and exposes them to the tanning principle (derived from oak-bark or other sources), and converts them into leather. I met with fellmongers' yards on the banks of streams at Cricklade, Fairford, Faringdon and Chipping Norton, and tanneries at Burford, Bicester and Chipping Norton. The total number of hides dressed on an average each week, is about 1,100. The whole of the waste water from these yards reaches the streams, and in one instance amounts to from 3,000 to 4,000 gallons daily. The pollution the rivers thus sustain is most objectionable.

3. *Breweries*.—The hwereries in the Upper Thames Basin, which cast their refuse directly into the streams, are few and unimportant, and were met with at Chipping Norton, Witney, Faringdon, Burford, King's Sutton, Highworth and Ampney Crucis. The pollutions attributable to these industries were not specially obvious.

4. *Barges*.—The number of barges which pass along the Upper Thames is so few that the pollutions they cause are nonimportant. None go higher up stream than New Bridge, which place they cannot easily reach unless they are "lightened." The cargoes are principally coal and stone. Night-soil (excrement) does not seem to be transported in this way. House-boats seldom pass higher up stream than Oxford, and only one was met with, or even heard of, in the reaches of the Upper Thames.

5. *Slaughter-houses*.—The garbage and blood from the slaughter-houses are usually consumed by the butchers' pigs; nevertheless much liquid refuse finds its way into the streams, either through street-drains or by more direct channels.

Slaughter-houses at the edges of streams were met with at South Cerney, Fairford, Woodstock.

It scarcely seems within the scope of this statement to allude to the quantity of water which is discharged from the watersheds of the Upper Thames and Cherwell, as the question essentially belongs to the province of an engineer, and not a medical man. I may, however, say that apparently the summer flow of these rivers is not so great as formerly. In several instances the low state of the water last year was alluded to by millers and others interested in water-power; no doubt, however, the restricted flow in 1890 was exceptional. I have previously said that the number of corn-mills is decreasing, but I only heard of one (at Woodstock) where the closure was due to scarcity of water. Agricultural drainage, now so general, no doubt causes the flood waters to pass off more quickly than was the case years ago, and consequently the rainfall is not stored up, and gradually released as it used to be. Almost every person I asked told me that, owing to the action of the Thames Valley Drainage Commissioners, the floods were not now nearly as persistent, nor as prolonged, as they were in years gone by.

I have shown, in my previous remarks and in the appendix, that the rivers and streams of the watersheds of the Upper Thames and Cherwell receive the drainage from many towns, villages, dwelling-houses, farm-yards, and industries, including that from between 8,000 and 9,000 water-closets. In consequence, a great amount of refuse reaches the water more or less directly, and in times of flood this is much intensified and particularly obvious. I have no doubt but that the pollution will be augmented as the population continues to in-



Cottages, South Petherton, Somerset.—Mr. Roland W. Paul, Architect.

crease, and as the water-carriage system of sewage removal becomes more general.

There can be no doubt that in many of the places named in this statement as polluting the river water, a good deal could be done to improve the present state of affairs; but on the other hand, at numbers it would be quite impracticable to do so. There would, therefore, under the most hopeful circumstances still remain a considerable risk of specific pollution of the river. Considering that the watersheds of the Upper Thames and Chertwell have an estimated population of some 295,000, that it is probable that the present pollutions (especially those furnished by excrementitious refuse) will increase, and that it would be impossible to avert the danger of specific pollution, even by filtration, I am firmly convinced that water drawn from such sources cannot be used for ordinary domestic purposes without great risk.

In examination, Dr. Foshrooke said that some localities were unsewered, but then sewage was readily disposed of by being allowed to soak away to "mines" or "lissoms." Some of these were porous cesspools near to the river, and he named these as conjectural pollutions. The Glyms might be polluted at Woodstock by the sewage of the town being poured into these mines or lissoms. The way of dealing with sewage at Woodstock was to find a crack and to connect cesspools with it, and the cracks carried off liquid refuse. Streams polluted as he had described, were "undesirable" sources of supply—he did not say "unsafe." Swindon sewage goes into the Wiltshire Ray, and after travelling four miles in that stream it can be seen for 200 yards in the Thames, before mingling completely with its water. Mr. Hill pointed out to the witness that the aggregate population of the towns without sewage farms was just over 33,000, so that it was rather "strong" to speak of the houses that stored their filth in ditches as "legion." The population appeared to be 163 to the sq. mile, so that the proportion of sewage to area was small. Reminded that the proportion of animals was one per acre, he repeated that animal pollution was not an important one; and the pollutions from manufactures were preventable, and could be suppressed with sufficient powers.

The Lea and its tributaries are the subject of an equally exhaustive treatment by Dr. Geo. Turner, whose conclusions we reserve until next week, when we propose also dealing with the evidence of Dr. Frankland and other analysts.

COTTAGES, SOUTH PETHERTON.

THESE cottages, occupying high ground about half a mile east of South Petherton, have recently been completed for Mr. W. F. Blake, from designs by Mr. Roland W. Paul. They are built of Ham Hill stone throughout, with the exception of the chimneys, which are of brick. The bricks and the tiles (of the patent "weatherproof" pattern) were supplied by Messrs. Major & Co. of Bridgwater. The builders were Messrs. H. J. Yandle & Son, of Martock.

MUNICIPAL ENGINEERING AT SCARBOROUGH.

THE Incorporated Association of Municipal and County Engineers (Northern Counties and Yorkshire District) had a very successful meeting at Scarborough on the 18th ult. They were received and welcomed at the Town-hall by the ex-Mayor, on behalf of the Corporation, in the unavoidable absence of the Mayor, who was away from Scarborough at the time.

Mr. T. De Courcy Meads, the President of the Association, having thanked the ex-Mayor for the welcome accorded to the Association, Mr. Howcroft was elected Hon. District Secretary.

Mr. G. Ball then read a paper, written by Mr. Joseph Peck, the Borough Surveyor, on "Scarborough, its Progress and its Public Works in Recent Years," which he commenced by saying that an account of all the works of improvement designed and executed by him during the twenty-two years he has held the office of Borough Surveyor would be too much to attempt to describe in detail on this, the first visit of the Association, therefore the paper more particularly mentioned in detail had been executed during the past ten years. After giving a brief sketch of the history of the borough, which was incorporated A.D. 1100, by a Charter from King Henry I., he said the place derived its name from Scar, a cliff, and Burgh, a castle, "The Castle Cliff" or "the Cliff with the Castle." It is situated at the end of a valley, and is built between 100 ft. and 500 ft. above Ordnance Datum, in a recess of a hazy midway between Flamborough Head and Whitby, and is one of the terminal stations of the York and Scarborough, Hull and Scarborough, and Scarborough and Whitby branches

of the North-Eastern Railway. It is mainly dependent upon its visitors, in the season, for its trade. The fisheries give employment to a number of its population, and there is a patent tiled floor-cloth manufactory in the borough.

The Corporation, he said, have ever been mindful of the fact that in order to keep pace with other health resorts and watering-places on the North-East and South Coasts, it must necessarily follow a progressive policy, and in order to keep Scarborough to the fore and put the town into a thorough sanitary condition and make the place attractive, they have borrowed large sums of money at different periods and expended them on sewerage works and various useful and important public improvements. During the past ten years there have been seven Local Government Inquiries for various works, and the amount sanctioned during that period was 81,400*l.*

The following are some of the main items of capital expenditure, the works for which have been designed and carried out by the author:—Sewerage works, 20,800*l.*; carriage drive and sea-wall on the South Foreshore, 4,500*l.*; works of paving, 20,500*l.*; improving highways, 30,800*l.*; public walks and pleasure-grounds, 6,000*l.*

Sewerage Works.

The town is divided into two drainage areas, with two main outfalls, following the natural valley lines of the district. The outfall on the south side commences near the Aquarium with a circular brick sewer 3 ft. 2 in. diameter, continuing along the Foreshore road to the West Pier, from this point its outlet is 4 ft. diameter, passing through the harbour and the outer pier with cast-iron pipes. The gradient varies from 1 in 300 to 1 in 500, and was constructed by my predecessors at different periods from 1863 to 1867. This outfall takes the subsidiary sewers in the Ramsdale Valley, the old part of the town, and the South Cliff, which in their turn receive the sewage of about 16,400 persons. The total length of this outfall is about 1,250 yards. The outfall on the north side of the town commences at High Peasholm and continues along the valley to the beach, where, until 1883, it continued across the sands, and discharged at low-water mark. At this period the Corporation were considering a scheme for improving the north undercliff and foreshore, and the question of dealing with this outfall naturally presented itself, as part of the beach



THE BUILD



DECORATIVE PANEL · YOUTH, THE T

Royal Academy Exhibition, 1892



INA PHOTO SPRAGUE & CO., 43 EAST HADSON STREET, NEW YORK, N. Y.

AND THE IDLERS"—By MR. G. NATORP

at this point would eventually be required as a hatching-ground. The author was therefore instructed to report upon this outfall. After careful consideration, and taking observations as to the currents in the bay, he recommended that it be continued northward along the base of the cliffs, and discharges below low-water mark into a creek of rocks at Scallyness Point, a distance of about one mile beyond the borough boundary. This recommendation was accepted and the works carried out under contract.

The new outfall was constructed of two half-brick rims in cement, with invert blocks and wrought-iron straps 6 ft. to 7 ft. apart, and where the crown of the sewer appeared above the level of the beach it was covered with cement concrete. It is 5 ft. internal diameter, and continued through the rocks with cast-iron pipes for a distance of 200 yards; the gradient is 1 in 500. The total cost of this outfall, including 1,850l. for the iron pipes, was 6,900l. The subsidiary sewers and drains discharging into this outfall are of various dimensions, some are brick sewers 3 ft. diameter and others stone-ware pipe sewers varying from 12 in. to 18 in. diameter. All the sewers have good falls, and are carried out in straight lines with manholes and lamp-holes in the usual way. The population served by these sewers and outfall is about 17,400.

During the past ten years about 3½ miles of brick and pipe sewers have been laid in various parts of the borough. The system of ventilation adopted for the past twenty years is by cast-iron pipes, varying from 4 in. to 6 in. diameter, carried up the gable ends of houses or other high buildings clear of all windows and chimneys; all surface ventilating grids have been abolished. There are about 250 of these vent-pipes on the drains and sewers at the present time, and others are being added every year as the town extends. No difficulty is experienced in obtaining permission from owners to fix these vent-pipes on private property. They are all placed on snuff-panels, but it is a very rare occurrence that any person requests them to be removed.

Street Works.

Most of the streets in Scarborough are now made up and repaired with tar paving. There are yet some streets, and the main thoroughfares into the town, which are made up and repaired with whinstone. In some cases, tar macadam is substituted for dry macadam. The whinstone is obtained from Inverkiething, Scotland, is hard broken, and costs 10s. 8½d. per ton in the yard when broken and screened.

The system of tar paving for footpaths has been adopted in this town for the past thirty years, and for roadways about twenty years, but it was not until 1883 that the Corporation decided to apply to the Local Government Board for sanction to borrow money for tar-paving works. The first application was made in November, in that year, and the usual inquiry was held by Mr. Arnold Taylor, C.E., the inspector appointed, and a loan was sanctioned for ten years. Several inquiries have since been held, and at the last inquiry held in 1891, by the late Mr. Thornhill Harrison, M.Inst. C.E., a careful examination of the paving was made by him, and in expressing himself highly satisfied with the system adopted said, "the secret of your success is that no water can get to the foundation." The amount sanctioned to loan up to the present time for tar-paving works is 20,863l., and instructions have been given for another application to be made for all the remaining secondary streets in the borough.

The following is a description of the materials and the process of preparation ready for laying on the roadways. The first coating is composed of local stone, gathered from the beach along the coast, and broken to a 2½-in. gavage, placed in long heaps about 15 in. in thickness, and about 5 ft. in width. Fires are kindled along the top of the macadam, and the whole heap covered with clinkers and cinders, obtained from the gas-works, and allowed to burn from twelve to eighteen hours, according to the state of the weather. The heat strikes down into the macadam and evaporates all moisture. The whole of the materials, including the clinkers and cinders, are turned over in its heated state, and cold tar is incorporated while the material is still warm, and then deposited ready for use. The second coating in composed of screened gravel to a

1½-in. gauge, and is prepared in a similar manner to the first coat, except that no clinkers are used, and the rough portion of the cinders used in bruising are removed and re-used. The finishing coat is a mixture of fine cinders and gravel, the whole to pass through a 3-in. mesh riddle. The cinders are laid on the ground about 6 in. thick, and 6 in. of fine gravel on the top. The whole is then covered with the rough cinders as before, and heaved in a similar manner to the other materials. After burning about forty-eight hours, the materials are passed through a 3-in. riddle to remove the rough cinders used in the heating process. The fine cinders and gravel being then mixed together, they are incorporated with cold tar and thrown up into heaps. The material for footpaths are prepared in the same manner as described for the second and finishing coats for the roadways. The footpath foundations being formed of brick rubbish or sandstone about 4 in. thick, great care being taken that no clay is allowed to come in contact with the materials.

Before laying down the tar paving the roadways are put into proper form and consolidated with a 10-ton steam road roller. The undercoat is then laid on and again rolled with the steam roller. The second coat is treated in a similar manner, and the finishing coat follows on, and a 7-cwt. roller passed once over it; a sprinkling of burnt gravel is then thrown on and rolled in. The rolling is continued until the surface is sufficiently set to admit of being rolled with a 2-ton horse roller 2 ft. 6 in. diameter. The traffic is allowed to pass over the road as soon as the last coat is laid on. This system of tar paving is easily repaired, is dry in a few minutes after a shower of rain, is not slippery except in frosty weather, and street cleansing and watering is reduced to a minimum; it is impervious to moisture, and is practically noiseless.

For a few months after the pavement is laid down, and until it is sufficiently set, complaints are sometimes heard, principally from cabbmen, of the heavy drag on vehicles running over it, but as the materials consolidate the surface hardens and the cause of complaint is removed. For the purpose of determining to what extent it was desirable in this borough to substitute tar paving for ordinary macadam the author prepared a return showing the annual cost of maintenance of some of the streets macadamised, and comparing the same with tar paving over the same period of ten years.

The following are some of the typical cases:—

	Tar paving, Annual Cost of Maintenance.	Macadam, Annual Cost of Maintenance.
St. Nicholas Street	25d. per yd. sup. ..	86d. per yd. sup. ..
Huntress-row	"d. do. ..	3d. do. ..
Esplanade gardens ..	Nil. ..	210 do. ..
Grove-terrace	"do. ..	"do. ..
Back-road	25d. do. ..	25 do. ..
Cromwell-terrace	Nil. do. ..	370 do. ..

Some roads in the borough have been laid with tar paving for a period of seventeen years, and have not cost more than 3d. per yard super, for repairs during that period. We find this kind of paving to be most suitable for all streets, except main thoroughfares, where the traffic is very heavy. It is greatly appreciated by the residents and the many visitors who from time to time visit our town.

The cost of the paving for roadways, exclusive of any foundation, is 2s. per yard super., and for footpaths 1s. per yard super.

Under the 150th Section of the Public Health Act all private streets are made up with tar paving and kerbed with 12 in. by 6 in. and 12 in. by 4 in. tooled Yorkshire kerb. During the past ten years plans and estimates have been prepared for making up about sixty streets, and in all cases the work has been executed by the Surveyor and his staff, and others are now in hand.

Royal Albert Drive and Sea-Wall.—Those Members of the Association who are also Members of the Institute of Civil Engineers may have read a paper by Mr. Whately Elliot, M.Inst.C.E., who was engaged as resident-engineer on the works which have up to the present been carried out in the North Bay. It is there recorded that "the Corporation instructed their Surveyor to prepare plans for the construction of a sea-wall and road at the base of the cliff."

To show the position of the author in relation to the works carried out, it may briefly be stated as follows:—

In April, 1882, the Corporation resolved to take into consideration the question of dealing with the undercliff, and construct a sea-wall in the North Bay, and instructions were given to prepare plans for a complete scheme, not only dealing with the North Bay, but continuing round the headland to the South Foreshore-road. The scheme proposed was for a sea-wall and marine-drive commencing at Peasholm on the north side, and extending along the North Sands at sufficient distance from the cliff base to form a drive 60 ft. wide, and a promenade 30 ft., to a point known as Coffee-Pot Rock, a distance of 1,600 yards. From this point the wall to be continued round the foreshore seaward of the Castle Cliff, at sufficient distance between the base of the cliff and the inside of the drive to form a respectable *alfris*. Round the headland the drive would be 40 ft. wide, and the promenade 20 ft. wide to its junction with the East Pier, thus forming a connecting link with the South Foreshore-road, a total length of 1 mile 1,320 yards.

This scheme, with sections of the proposed wall, were submitted to the late Sir John Coode for his opinion and report. In June, 1883, the report was received approving this scheme. The following is an extract taken from the Report:—

"There can be no question that the drive and promenade would add considerably to the attractions of Scarborough. The wall from Peasholm to the northern point of the Castle would not be subject to a heavy wave stroke; not so, however, the length from the latter point to the East Pier, which would be very much exposed, more so, in fact, than any other structure erected for a similar purpose with which I am acquainted. There need, however, be no apprehension on this head, as the height of the wall (19 ft. above high water of spring tide), coupled with the effect of its concave face, and the great mass of the work, would be sufficient to ensure its security. There can be no question that Mr. Petch exercised a wise discretion in proposing a concave profile for the wall, as it will throw back the sea more effectually than any other, thus proving a drier road, and at the same time minimise the stroke of the waves against the works."

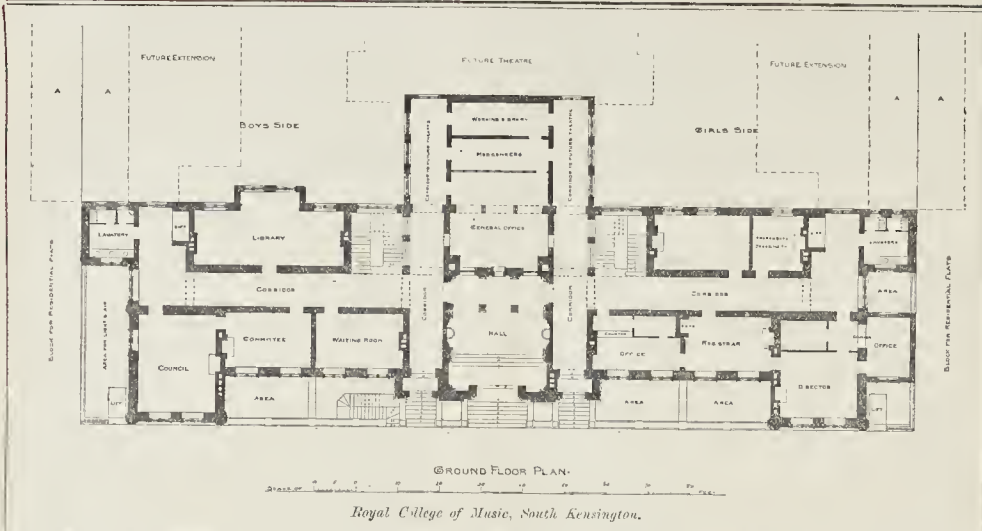
In the autumn of 1885 a large quantity of shingle appeared on the foreshore, and in anticipation of the wall being constructed the author commenced relief works, and collected about 6,300 cubic yards; this material was afterwards found to be of the greatest service in the work, as no shingle of any quantity has since appeared.

The works as carried out are part of the above scheme somewhat modified, the position of the wall being considerably nearer the base of the cliff, and are fully described in the paper referred to, and recorded in minutes of proceedings of the Institute of Civil Engineers, vol. cv., Sessions 1890-91, Part III. Since the work was completed the erosive action of the sea upon the shale at the toe of the wall would, if allowed to continue, have undermined the foundations. Within a period of twelve months it was found in some places to have scooped out to a depth of 3 ft. into the shale. The author has since constructed an apron, which was formed by excavating out the shale to an average depth of 2 ft., forming a toe of concrete, and paving the surface with Yorkshire sets, 9 in. thick, and grouting with cement. The toe of the apron to a depth of 4 ft. below the level of the shale is formed of concrete with a special facing of one part of sharp sand to one of cement 3 in. thick, and was put in with the mass work. The concrete in mass was composed of 5 parts of shingle, 2 of sand, and 1 of cement. The total length of the apron is 800 yards, and is 15 ft. wide, with a fall of 1 in 4½ in., and cost 2,600l. It is anticipated that this work will prevent the further scouring away of the beach, and protect the wall for many years to come. It is the intention of the Corporation at some future date to continue the drive round the headland, and in anticipation of this work the necessary Parliamentary plans were prepared, and the scheme was embodied in an Improvement Act which was obtained in 1889. The Parliamentary estimate was 70,000l. In the event of these works becoming an accomplished fact, Scarborough would possess a marine drive about 2½ miles in length.

The Clarence Gardens in the undercliff are over 19 acres in extent. A hand-stand and shelters have been erected, some of which have ladies' cloak-rooms and lavatories attached.

The total cost of the North Cliff Improvement Works has been 48,639l.

[Continued on next page.]



Illustrations.

DECORATIVE PANEL: "YOUTH, THE TOILERS AND THE IDLERS."

THIS panel, a decorative painting by M. Gustav Natop, now exhibited in the Architectural Room at the Royal Academy, forms part of the scheme of decoration of the upper portion of a drawing-room wall, above an oak dado 7 ft. 6 in. high. The subject of the whole scheme of decoration is "The Three Ages."

The scheme of colour in the room is that of the oak painted dado and of the red and yellow employed in the panel painting; the flowing lines in the composition are intended to contrast with the vertical and horizontal lines of the dado.

We have printed the lithograph in a red tint, as coming nearer to the general effect of the original drawing than black.

ROYAL COLLEGE OF MUSIC.

THIS building stands on a site 200 ft. square, and at present consists in a great measure of a number of small rooms for the instruction of single or at most two or three pupils at a time. There are a few *ensemble* rooms and a rehearsal room, 42 ft. 3 in. by 24 ft. 6 in., but at present no large concert-room. A Council-room and committee-room, a library, rooms and offices for the Director and Registrar, a kitchen, and dining-rooms for the professors, pupils, and servants, are provided.

It is intended that when complete the building shall comprise a theatre capable of being used, not only for operatic performances, but as a lecture-hall and orchestral concert-room. Provision for this is made in the general plan. Room is also left on the site for future extension by wings running north and south at each end. The public entrance and general offices are in the centre. The entrances and staircases for male and female students are on each side. The organ-rooms are in the towers at each end.

The treatment of the design, rendered difficult at the outset by the multiplicity of small rooms, was still further complicated by the final decision to heat the building with separate fireplaces to each room, and by the new road along the north front being raised 19 ft. above the level of the site, necessitating a basement and sub-basement, and curtailing the apparent height of the building.

The architect is Sir A. W. Blomfield, A.R.A., and the drawing of the elevation is exhibited at the Royal Academy.

NOS. 5 AND 7, CADOGAN-GARDENS.

THIS is a drawing of two of the houses in course of erection on the Cadogan estate, Chelsea, now known as Cadogan Gardens. The

internal fittings are principally of painted pine, with wainscot in dining-room and staircase. The materials used in these fronts are of Bracknell bricks, and cut and rubbed brick-work, with Corsham Down stone dressings. The work is being carried out by Mr. H. J. Wright, from the designs of Mr. Fred. G. Knight.

HOUSE AT NORTHWOOD.

The illustrations show north and south views of a house which has lately been built at Northwood.

The walls are faced with red bricks, and the roofs are tiled. The tower on the north side is "rough-cast."

The whole of the wood-work is painted white, except the doors and shutters, which are bright green.

Mr. R. A. Briggs was the architect, under whose supervision the works were carried out by Messrs. Charles Brown & Sons, of Harefield. The drawings from which the illustrations are taken are exhibited at the Royal Academy.

MUNICIPAL ENGINEERING AT, SCARBOROUGH.

CONTINUING his paper,* Mr. Petch next referred to the

Holbeck Pleasure-grounds.

The "Gardens by the Sea" are situate at the end of a ravine on the south side of the town, close to the beach. In laying out these grounds a considerable quantity of water has been found in the cliff, and some heavy drainage works have been constructed at different periods during the past six years. The infiltration of surface water and atmospheric influences upon the upper strata of the cliff has caused heavy slips to occur at different periods.

The method adopted to secure and protect the walks above on going into the sea, was to put in 6-in. vertical drains with open socket-joints into the solid strata of clay underlying the loose and disintegrated earth, and filling up the trenches with rubble-stone, after which benching into the solid strata and forming an abutment for a dry rubble screen on the face of the cliff. Where these works have been carried out the face of the cliff has been preserved.

Some of these works are now in progress, and other portions will have to be dealt with before the whole of the undercliff is made secure. The base of the scarf of the cliff is being protected from the encroachments of the sea by a pitch-faced stone wall which is now in course of construction; this wall is to be continued further southward to the boundary of the grounds.

* See previous pages.

These grounds are 2½ acres in extent, and well laid out, and although great expense has been incurred in order to maintain the gardens, and further trouble is anticipated, it is the intention of the Corporation to make these grounds secure and complete the laying out as speedily as possible. These gardens are highly appreciated by the visitors and residents, and have proved to be one of the best improvements carried out for some years. Shelters and urinals are provided similar to those in the Clarence-gardens.

The cost of the works, up to date, has been £5,100.

A number of other improvements of some importance have been executed during the past ten years.

Mr. Petch, in concluding his paper, acknowledged the services rendered by his chief assistant, Mr. George Ball, Graduate Member of the Association, in the preparation of this paper, and who has performed important duties in connexion with the designs and execution of the works described herein.

The following statistics were appended to the paper:—The area of the borough is 2,292 acres, and the Parliamentary and Municipal boundaries are co-extensive.

The following table shows the number of houses and the population in each of the census years from 1861 to 1891 inclusive.

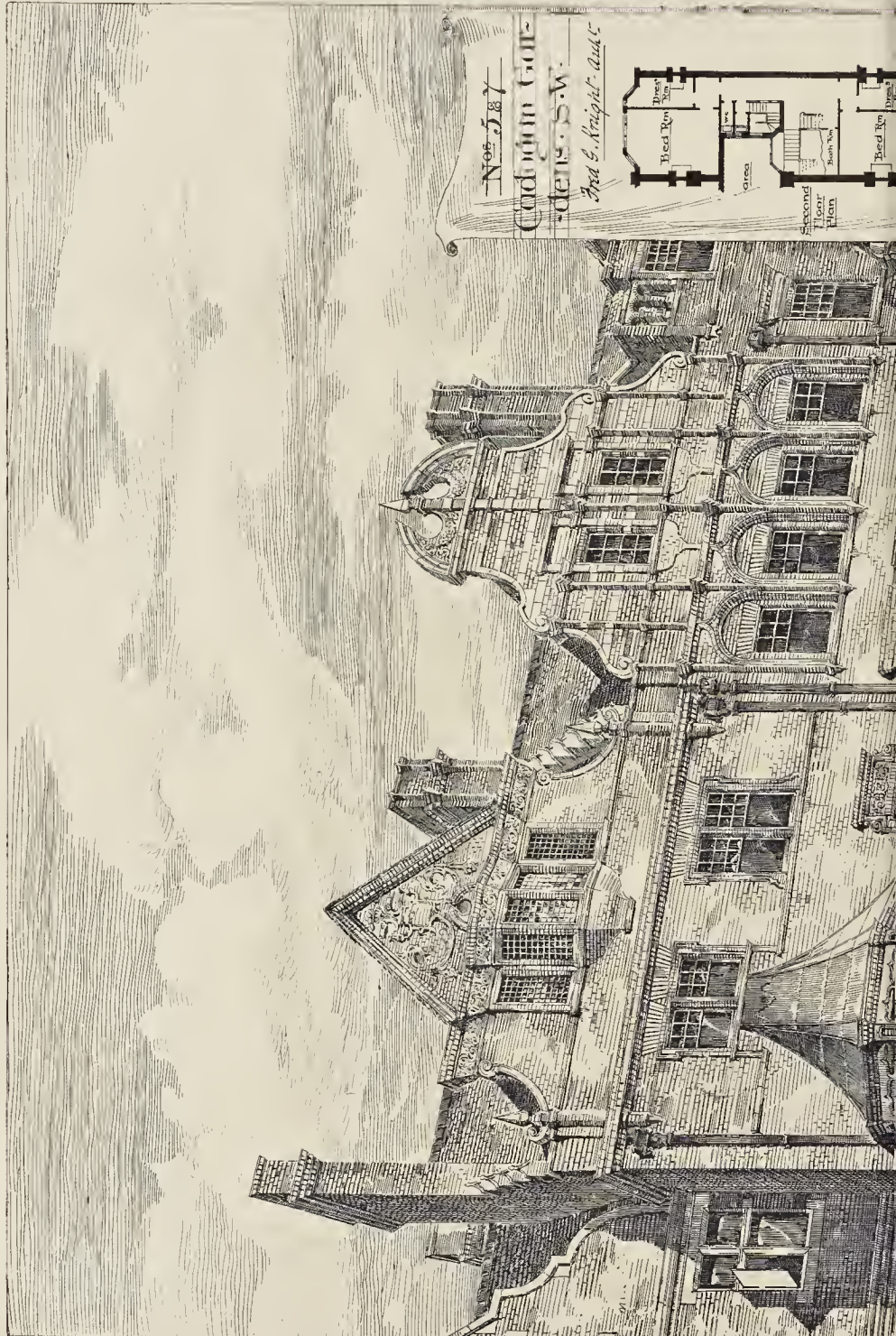
Census year.	Inhabited Houses.	Uninhabited Houses.	Houses.	Population.	Increase of population in each decade.
1861....	3,990	214	4,154	18,377	5,422
1871....	5,161	661	5,722	24,081	5,744
1881....	6,242	676	6,718	33,236	6,165
1891....	7,236	797	8,033	33,777	3,541

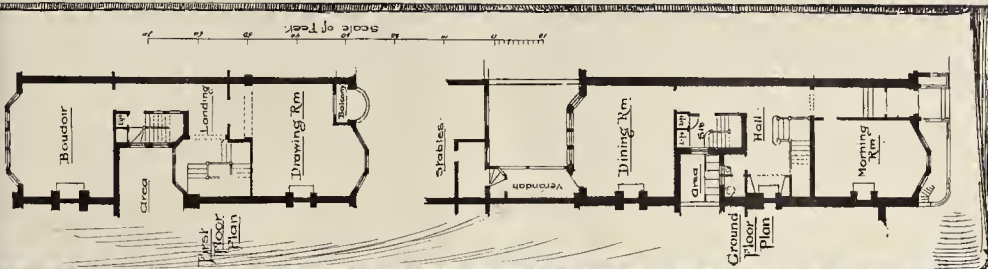
It is estimated that in the season the population is about 50,000. A census taken by the Corporation on the night of August 26, 1882, of non-residents in the borough, was 16,162. In 1881 the rateable value was 145,601*l.* In 1891 it was 181,232*l.* The death rate for ten years from 1881 to 1890 are as follows:—1881, 16.34 per 1,000; 1882, 18.22; 1883, 18.84; 1884, 17.31; 1885, 16.67; 1886, 18.40; 1887, 16.64; 1888, 15.66; 1889, 17.40; 1890, 16.40.

The town is built between the low level of 25 ft. and the high level of 200 ft. above ordnance datum. There are about thirty-five miles of public highways in the borough, of which about five miles have been declared main roads, and an arrangement has been made with the North Riding County Council for an annual payment of 1,500*l.* towards the cost of maintenance.

The total rates in Scarborough, including poor rate, school board rate, burial board rate, &c., amounted last year to 5s. 6d. in the *£*. The general district rate is 3s. 2d. in the *£*; the

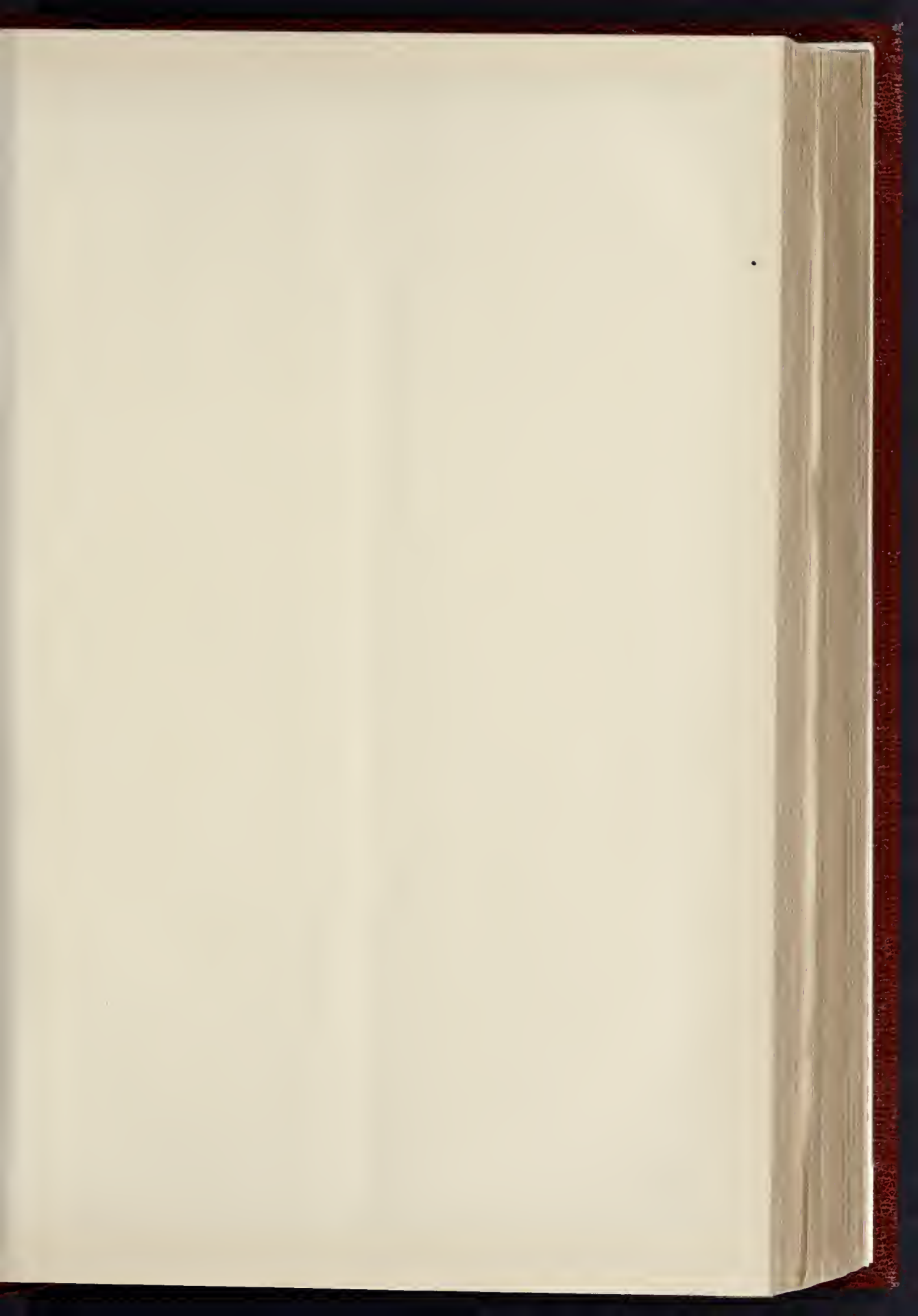






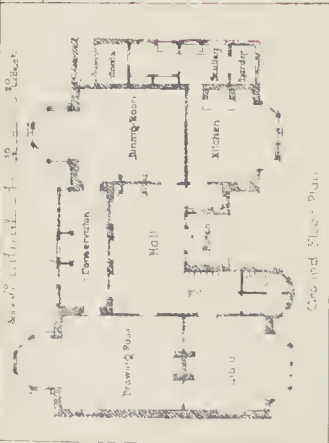
MODEL LITH. DRAWN & ENGRAVED BY J. H. B. STREET & CO. LONDON

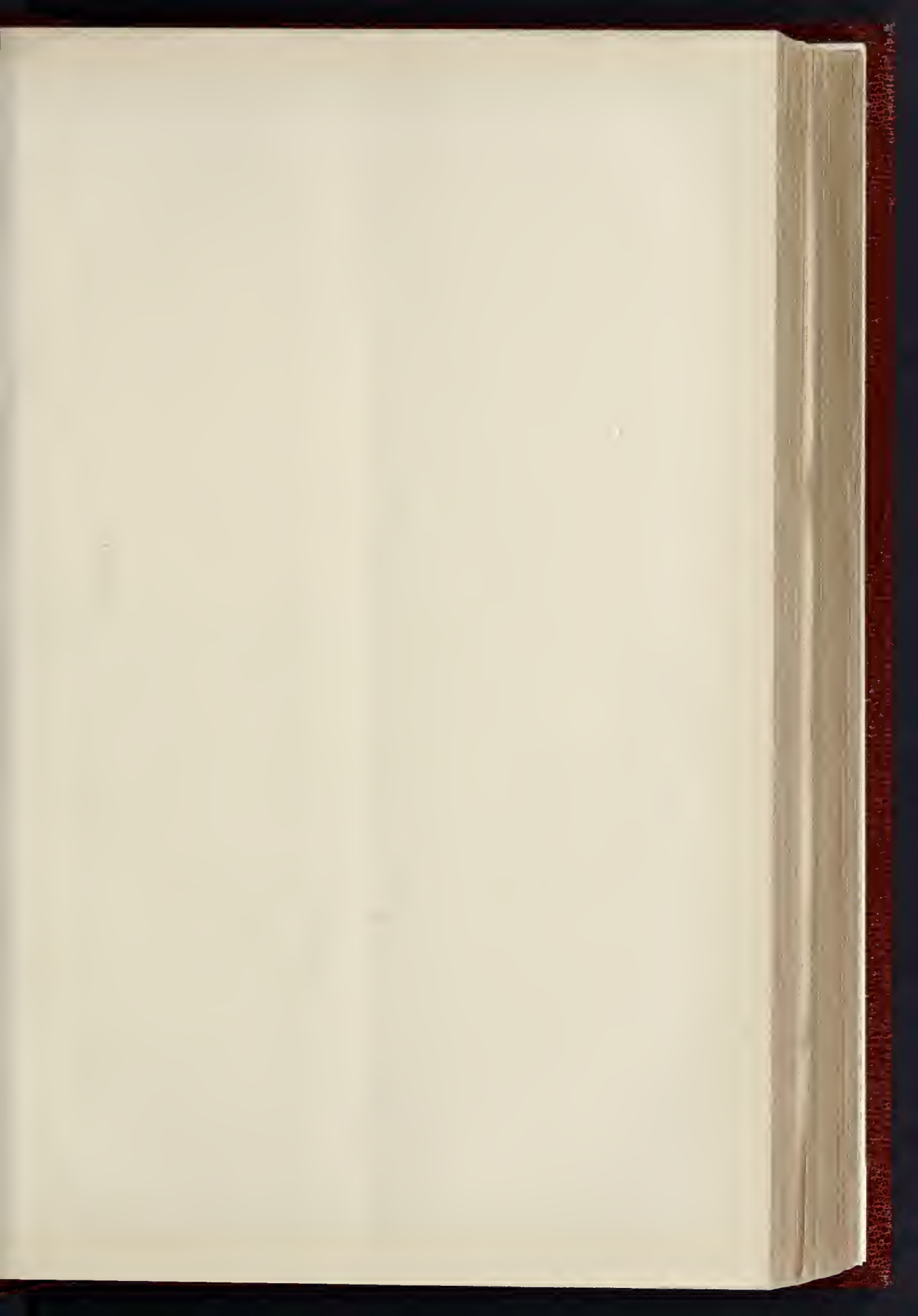
John H. B. Street



THE BUILDER, JULY 16, 1892.

House of Northwood.
By Mr R A Briggs, A.R.I.B.A., Architect.





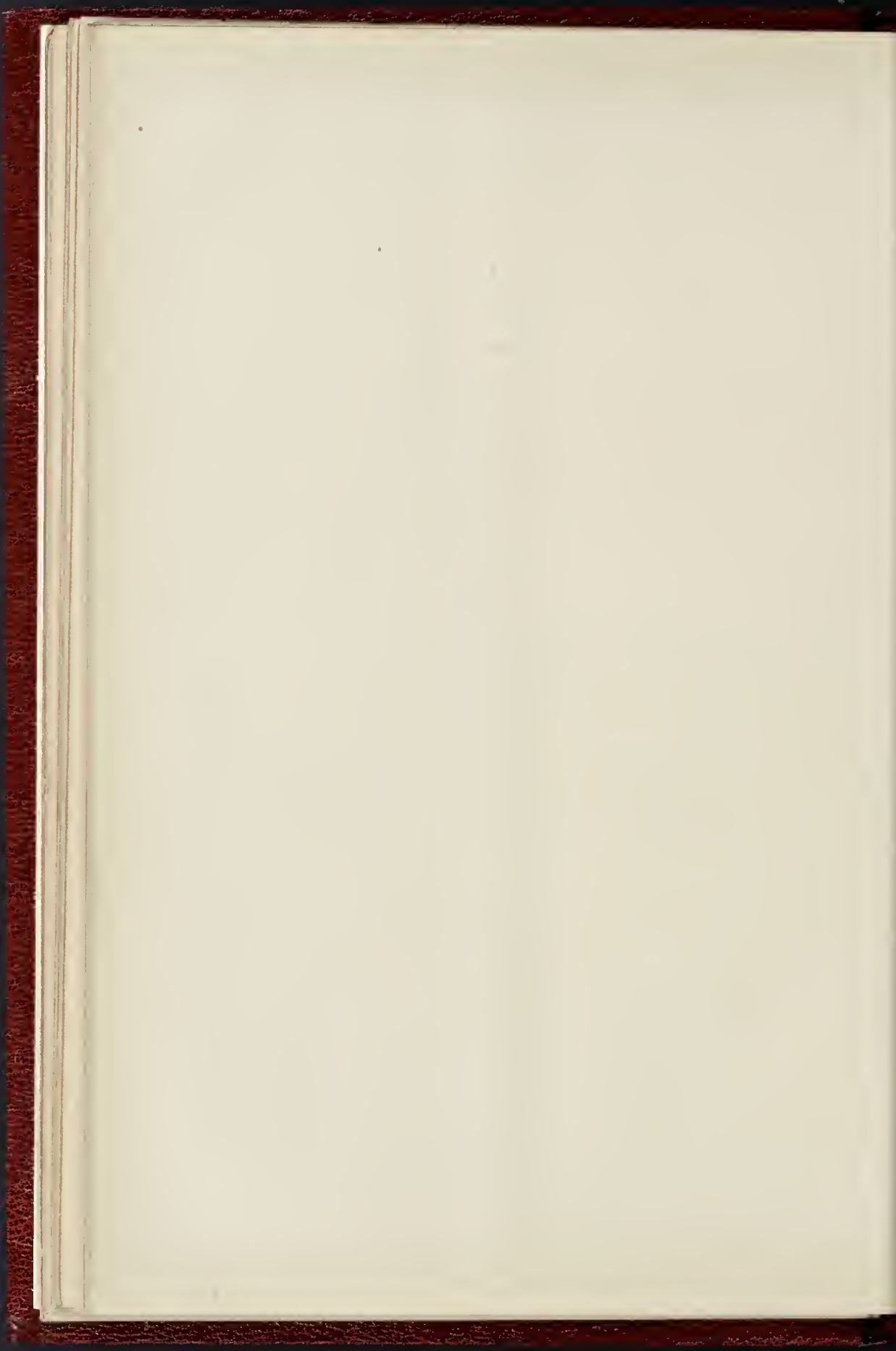


Royal Academy Exhibition, 1892.

ROYAL COLLEGE OF MUSIC, SOUTH KE



SIR A. W. BLOMFIELD, A.R.A., ARCHITECT



same now as it was in 1887 in 1888 and 1889 this rate was 2s. 10d. in the £, and in 1890 6s. in the £.

After some discussion, in the course of which the speakers expressed themselves in highly eulogistic terms regarding the system of road construction and its attainment described in the paper, Mr. William Millhous, Assoc. M. Inst. C.E., Water Engineer, read a paper on the

Scarborough Water Works.

He said that in the year 1845, when the inhabitants of Scarborough were beginning to tire of waiting their turn for several hours at the public conduit by the Market Cross to draw water, a company was formed for the purpose of providing the town with a plentiful supply of pure water. This was obtained from a spring at Cayton Bay, which had been previously utilised for working a corn-mill. The mill and spring were bought, and the mill-wheel was the first motor used for working the pumps, but for a short time only. Mr. Thomas Wicksteed having been called in, he advised that a Cornish pumping-engine, capable of pumping 400,000 gallons per day be put down, which was accordingly done, and in 1853 another similar engine, capable of pumping 650,000 gallons per day, was added to this station. The engines are still in working order, and held as a reserve in case of need. In 1872, when the growth of the town demanded a further provision for its immediate needs, the old Company sank a well, and put down a pumping plant at Osgodby, situate about a mile inland from Cayton Bay.

In 1878, when the Company proposed to bring water by gravitation from reservoirs to be constructed on Jagger Howe Beck, lying on the moors to the north of Scarborough, the Corporation bought the Water Works from the Company, and immediately proceeded, under the advice of Mr. Philliter, of Leeds, to construct new works at Irton, where a well was sunk and engines erected to pump the water into the new service reservoirs, which were built at the same time on Oliver's Mount.

Cayton Bay.—The water at this station is obtained from an underground reservoir formed by a bank of 120 ft. throw in the Oolite formation, by which the Oxford clay is banked up against the calcareous grit. The clay has been tunneled through, and the water conducted to a dam from which the engines draw their supply. The yield from this source is about 1,000,000 gallons per day. As the engines are of so old and well-known a type, they call for no special remarks here.

Osgodby.—The water at these works is obtained from a well 10 ft. in diameter, lined with brick, sunk 127 ft. into the calcareous grit, with drifts in three directions driven from the bottom of the well. The yield from this source varies between 580,000 and 865,000 gallons per day. The engine is a Cornish Bull engine, placed directly over the well, and capable of raising 600 gallons per minute, through a 12-in. main, about one mile long, to the Osgodby Hill reservoir. The head in the main is 205 ft., including 10 ft. for friction. Steam is supplied by two Lancashire boilers at 40 lbs. pressure.

Irton Works.—The well at this station is 428 ft. deep, the first 70 ft. being 10 ft. diameter, and lined with cast-iron cylinders firmly bolted together and sunk down into the Kimmeridge clay, where the bottom of the cylinders was closed in with cast-iron plates, and a bore continued for 28 ft., lined with 24-in. tubes of cast iron, until the water was reached. A plug was fitted on the top of the 24-in. tubes to shut down the water.

The bore was sunk for 152 ft. at 20 in. diameter, and for 178 ft. at 12 in. diameter, until the Oxford clay was reached.

Well.	
	ft.
10 ft. cylinders	70
24 in. tube	28
20 in. rock	152
12 in. "	178
Total	428
Strata.	
	ft. in.
Boulder clay	53 6
Kimmeridge clay	45 0
Upper calc. grit	46 6
Caic. and lower limestones	129 6
Lower calc. grit	135 0
Changin' to Oxford clay	28 0
Total	428 0

The overflow from the well is about 1,000,000 gallons per day, and the engines have never materially lowered the water when pumping continuously day and night. It has been proved by the author that the river Derwent keeps this strata continually supplied through fissures in the rock in the bed and sides of the river. Having placed a dam across the entrance to one of the largest of these swallow-holes, and stopped the water from going in, all the wells in the neighborhood were dried up, and the surface of the water in the Irton well was also lowered, but to so small an extent that it was considered the loss of this supply would not seriously affect it. The engines at Irton are a pair of beam engines, double-acting, rotative, and condensing, capable of lifting together, through a 13 in. main about four miles long, 1,000,000 gallons per day, either to the upper or lower reservoirs on Oliver's Mount. The water is raised from the well into the condenser tanks by combined bucket and plunger pumps, and passed through the condenser to the force pumps. The rams of the force pumps are pistons packed with gutta-percha rings in place of the leather packing originally designed. The capacity of the pumps is 29 25 gallons per revolution, and the quantity delivered into the Mount Reservoir, 27 25 gallons, being an efficiency of 93. Air is fed into the air vessels by Wipperman's injectors.

Steam is supplied by two Lancashire boilers with Fox's corrugated flues and Vicar's feeders. Coal is delivered at the works, into bins under cover, by a siding from the North Eastern Railway, thence conveyed in half-ton tramway wagons to the boilers. The head in the main, above the gauge in the engine room, to the lower reservoir, is 240 ft., and when the engines are working this is increased 60 ft. when raising 800 gallons per minute. The engines are 42 i.h.p. each, and the coal burnt averages 3 5 lbs. per i.h.p.

Reservoirs.—The service reservoirs are three in number.

1. A high-level reservoir situate on the top of Oliver's Mount, 505 ft. above Ordnance Datum, capacity 1,500,000 gallons. This reservoir has just been covered with a roof of concrete. The concrete is supported on rolled steel joists, 12 ft. apart, which rest on brick pillars. The concrete is covered with two coats of asphalt, and finally with a covering of broken stone and gravel.

2. A low-level reservoir situate on the west side of Oliver's Mount, 338 ft. above Ordnance Datum, capacity 1½ million gallons. This reservoir is covered, built of brick, and lined with salt-glazed bricks of local manufacture. A bed of puddle is laid under the reservoir and round the sides. The cover is formed of brick arches carried by cast-iron girders resting on brick pillars, which stand on foundations formed by inverted groined arches bedded on lime concrete. This reservoir has remained perfectly sound, and is very easily kept clean and in order.

3. An open reservoir at Osgodby Hill, situate about two miles from Scarborough, and 337 ft. above Ordnance Datum. Capacity 4½ million gallons. A new floor has recently been laid in this reservoir, the area being 5,354 sq. yards. The floor was formed of concrete 6 in. thick, made of 4 parts broken brick, 2 parts small gravel and sand, to 1 part of cement, and topped with 1 in. of blue granite chips passed through a riddle of ½ in. mesh, and cement 2 to 1. This has formed a solid and smooth floor, capable of standing the thorough sweeping and cleansing that may become necessary.

All the reservoirs are connected, and the mains so arranged that the engines can pump into any reservoir or direct into the town.

Supply.—The total supply of the town is as follows:—

	Gallons.
Cayton Bay per day	1,000,000
Osgodby Well	900,000
Irton Well	1,160,000
Total	3,060,000

all of which can be pumped into the reservoirs by the engine power at command.

The largest daily consumption is in August, when it has reached 1,250,000 gallons, the number of inhabitants being about 50,000. After deducting water used for trade and similar purposes, the consumption per head per day equalled 20½ gallons. . . .

Distribution.—Trunk mains conduct the

water through the chief thoroughfares of the town, and each street branching off, has a main with its own sluice-valve for turning off, and flushing-cock at the end. The flushing is regularly attended to, and is found to give better results than allowing the water to circulate by having the by-mains connected to the trunk-mains at both ends. On account of the hilly nature of the town, the author has introduced pressure reducers on two of the trunk-mains to relieve the strain on the house-fittings. One reducer, a 5-in. is fixed on the 8-in. main from the high-level reservoir, and reduces the pressure from 110 lb. to 60 lb. on the square inch. The other reducer, also a 5-in., is fixed on the 7-in. main that supplies the Sandside district, and reduces the pressure from 80 lb. to 50 lb. on the square inch. Both have answered perfectly, and caused no trouble.

Meters.—The meters in use are Siemens's pattern, made by Guest and Chrimmes. With constant attention these meters give fairly good results, especially where a regular supply passes through them. Every meter is tested before it is sent out, and also immediately it is brought in, and a careful record of the testing is kept. This record has proved most useful, especially in cases of dispute with dissatisfied consumers. Regular inspection for the prevention of waste is carried on daily, with night inspection at short intervals. At night each main is tested alternately by closing and sounding the street valve. Water passing is at once detected, and by sounding the stop taps in the street, the leakage is localised and reported, when the day inspectors complete the search by internal examination in the day-time. A Deacon's meter has lately been fixed so as to control the oldest part of the town, and has proved a very useful instrument for saving water. Leakage from the mains in quantity are at once shown on the diagrams, and the work of the inspectors most effectively controlled. The waste from fittings in this district has already been reduced about 3,000 gallons per hour. This, however, will only be maintained by most constant attention. Rules and regulations have been adopted to ensure the use of good materials and workmanship in relation to water fittings, and all taps are tested and stamped by the Water Department before they are fixed, although the Local Government Board would not sanction a clause in the regulations making this compulsory. We have no trouble in getting the plumbers to send in the taps for examination, as they find it is to their advantage to do so, a large number of taps having to be returned to the makers as defective.

The following clause was inserted in the Scarborough Improvement Act, 1889, on the recommendation of the author: "The Corporation shall not be bound to begin to supply water to any person in respect of any premises, unless and until the water regulations of the Corporation applicable to such premises, shall have been duly complied with."

Main Scraping.—As the author has been obliged to either abandon or clear an 8-in. main, the first one laid by the old company, it may be of interest to give some data concerning the work. The total length of the main to be cleared was 2,240 yards, the diameter of which had become reduced to 5 in. by a hard incrustation, something after the form of coral in structure, and composed of lime, silt, and iron rust, the pipes not having been coated as is at present customary. Scrapers and batchboxes were obtained, and the latter fixed, one at each end of the main, and one half way between, near to a water-course, to act as a flush-out. All being ready, the scraper was placed in the main, near to the Osgodby Reservoir, and the water turned on, giving a pressure behind the scraper of 30 lbs. to the square inch, which, however, failed to move it.

An engine was then started to pump, and the pressure got up to 50 lbs. on the square inch with a like result. The scraper was taken out and replaced in the main at the Scarborough end. Water was then turned on from the high level reservoir, which gave a pressure of 95 lb. to the square inch. Immediately the scraper started, and got through to the flush-out half way on the main in a few minutes, the pressure falling to 65 lbs. on the square inch during the passage of the scraper. This part of the main must have been fairly clear, but the scraper brought some stones and a large piece of lead along with it. The scraper, having had the leather clacks, &c.

attended to, was put into the main again and the hatchbox cover hotted on. The water was again turned on, but, not having an open end on the main for the water to get clear way, slow progress was made, and finally the scraper stopped at a had joint. Having cut it out and replaced it, the main was opened out at the end and steady progress was made until the scraping was completed.

The rumbling noise made by the scraper when working, can easily be heard on the surface of the ground by anyone walking above it, and the pace at which it travelled, in our case, was a very fast walk. The amount of silt brought out of the main was astonishing. The scraper has been put through the main again this year, and it is intended that the same shall be done annually, to keep the main in good order.

The cost of the first scraping was:—

	£	s.	d.
Plant, including hatchboxes and fixing	48	18	2
same	13	0	4
Scraping main	43	18	6
	£61	18	6

After an interesting discussion, the members visited the stables of the Borough Sanitary Department and other works, expressing themselves well pleased with what they saw, and they were subsequently entertained at luncheon by the Mayor.

THE SURVEYORS' INSTITUTION: PROFESSIONAL EXAMINATIONS.

The Secretary of this Institution has issued a circular calling special attention to the fact that, under the revised rules, all applications from candidates for the Professional Associateship or the Fellowship Examinations for 1893 must reach the Secretary before the end of the preceding month of October, instead of the end of the preceding month of November, as under the old rules.

Attention is also called to the fact that the Division V Examination, which has been suspended for some years past, is now revived in a greatly modified form. Those whose qualifications fall within the conditions of entry for this Examination can, by means of it, qualify directly for the Fellowship of the Institution without passing a previous Examination.

A Direct Fellowship Examination will be held in March next, contemporaneously with the other Professional Examinations.

FELLOWSHIP EXAMINATION.

The following gentlemen having passed the requisite Qualifying Examination, have been transferred by the Council to the Class of Professional Associates to that of Fellows:—

Brackett, F. H., Tunbridge Wells.	Kemp-Smith, J. F., Orsett.
Corderoy, A., London.	Marlin, T., Redbourn.
Davey, H. T., Hastings.	Miler, J. J., London.
England, W. F., Leeds.	Richardson, O. A., London.
Grogan, H. H., London.	

SPECIAL-CERTIFICATE EXAMINATIONS.

The following members of the Institution have passed the recent Special-Certificate Examination in Sanitary Science:—

Assiter, H. G., London.	Inkpen, G. C., Southsea.
Foster, F., London.	Jones, H. A., London.

ARCHITECTURE AT UNIVERSITY COLLEGE.

The following awards have been made to students attending Professor T. Roger Smith's classes:—

(A.) *Fine Art*.—1st Class Certificates: W. J. Keith (Donaldson Medal), Miss G. M. Dalley (Book Prize). 2nd Class Certificates: Clyde Young, W. C. Brown.

(B.) *Construction*.—1st Class Certificates: W. G. Hazell (Donaldson Medal), A. F. Wickstead (Book Prize), H. G. Church, C. L. T. Griffith. 2nd Class Certificates: A. R. Hessel, G. H. Coloe, Clyde Young.

Professor's Prize for Sketches.—W. C. Brown. *Carpenter's Company's Prizes*.—Architectural Drawing:—Theobald, Constructional Drawing: H. I. C. Kuhl and A. Hayward.

CHANGE OF ADDRESS.—Mr. Robert Williams, A.R.I.B.A., has removed from 8, John-street, Adelphi, to 104, Bury Ash-hill, S.E.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of this Council was held on Tuesday afternoon at Spring-gardens, Mr. Dickinson, the Deputy-Chairman, presiding in the first instance.

Election of Chairman.—On the motion of Lord Carrington, seconded by Mr. John Burns, Mr. John Hutton, Vice-Chairman, was unanimously elected Chairman, in the room of Lord Rosebery, resigned. Mr. Hutton then took the chair, and thanked the members for electing him.

The Vice Chairmanship.—On the motion of Dr. Collins, it was resolved that next Tuesday the Council should proceed to the election of a Vice-Chairman in the place of Mr. Hutton.

Tenders.—Tenders (three) were received for the erection of a school building at the Crossness Pumping Station.

Insanitary Areas at Shoreditch and Deptford.—The Council proceeded to the discussion of the adjourned report of the Public Health and Housing Committee, who recommended the approval of schemes for the improvement of insanitary areas in Shoreditch and in Deptford. The estimated cost of the Moira-place and Plumber's-place, Shoreditch, scheme, not including the cost of making up the new roads, was—gross 60,000*l.*, recoupment 8,700*l.*, leaving a net cost of 51,300*l.* It was estimated that 550 persons of the artisan class would be replaced, and 400 rehoused. The Committee recommended approval of the scheme, and the authorisation of the Council's officers to attend the local inquiry to be held in support of the scheme.

Mr. Bruce moved and Mr. Catmnr seconded as an amendment,—

"That the recommendation be referred back to the Committee, with instructions to amend the plan of the scheme by omitting from it that part which involves the acquisition of the houses facing Nile-street."

A long discussion ensued, the result of which was that the amendment was lost and the recommendation approved.

Mr. Beachcroft then submitted the report as to the Mill-lane area, Deptford, with reference to which the Council were asked to pass the following:—

"That it appears to the Council that the closeness, narrowness, bad arrangement, and bad condition of the buildings situated upon a certain area known as the Mill-lane area (comprising houses in Mill-lane, Lambert's-buildings, Morse-buildings, Knott's-buildings, and F. and P. place) in the parish of St. Paul, Deptford, in the County of London, delineated and coloured red on the plan now before the Council, marked A, and the want of light, air, ventilation, and proper conveniences and other sanitary defects in the said buildings, are dangerous or prejudicial to the health of the inhabitants of the said buildings and of the neighbouring buildings, and that the demolition, reconstruction, and rearrangement of the said buildings is necessary to remedy the said evils, and that the area comprising those buildings and the yards, outhouses, and appurtenances thereof, and the site thereof, is too small to be dealt with as an unhealthy area under Part I. of the Housing of the Working Classes Act, 1890, and the Council doth by this resolution direct a scheme to be prepared under Part II. of the said Act for the improvement of the said area."

After some discussion, and the rejection of an amendment to refer the matter back to the Committee, the recommendation of the Committee was carried.

Fire Brigade Station, East Dulwich.—The report of the Fire Brigade Committee contained the following paragraph:—

"The Council on May 24 last resolved to accept a tender of Messrs. Stimpson & Co., amounting to 10,200*l.*, to erect a fire-engine station at East Dulwich, provided that that firm agreed to the insertion in the contract of the condition that they would pay the London rate of wages, and observe such hours of labour as were generally accepted in London, as fair in the trades they employ, and the Council instructed the Solicitor to prepare a contract with the firm. On the Solicitor informing Messrs. Stimpson & Co. that the contract they were ready for their signature, they wrote a letter, dated June 20, pointing out that since their tender was submitted (May 3), the rate of pay of all workmen, skilled and unskilled, had been increased by a halfpenny an hour, and that as their tender was based on the old rate of pay, the new scale which under the Council's resolution would have to pay would add materially to the cost of labour. They therefore asked that they might receive an amount in excess of the sum named in their tender to cover the increased expenditure to which they would be put for wages. They have since named 350*l.* as the figure to be added to the sum quoted in their tender. The Council will remember that, after considerable difficulty had been experienced in finding a site, tenders for the erection of the station were opened at the meeting

of the Council on February 16 last, the tenders being as follows:—

Messrs. G. Munday & Son	£10,480
" Scharien & Co.	11,427
" Stimpson & Co.	11,540
" J. Garrett & Son	14,080

These tenders were referred to us, and after careful consideration we came to the conclusion that it did not be well for the Council to accept any of them, but that the specification of work should be revised, and that fresh tenders should be invited by public advertisement. This course met with the Council's approval; fresh tenders were accordingly obtained, which, on being opened at the meeting of the Council on May 3, were found to be as follows:—

Messrs. Stimpson & Co.	£10,260
Messrs. G. Munday & Son	10,716
Mr. H. L. Holloway	10,864
Messrs. Holliday & Greenwood	10,877

As stated above, the Council conditionally accepted the tender of the first-named firm. The Architect informs us that he is satisfied, from inquiries which he has made, that Messrs. Stimpson & Co. did not, in making their second tender, take into account any possible future rise in the rate of wages, and it appears to us, under all the circumstances, that it would be advisable to comply with Messrs. Stimpson & Company's request, and add to the amount named in their tender the sum for which they ask, and which the architect reports to be reasonable. It will be observed that if Messrs. Stimpson's tender be increased by 350*l.* it will then be 106*l.* below the tender of Messrs. Munday & Son, who would probably also ask for an increased sum if the work were entrusted to them. The only alternative open to the Council would be to again invite fresh tenders, a course which, as one recently opened at Wandsworth, is not be advantageous to the Council. One result of such a course would be this—that as the contract could not be entered into before October, the foundation work of the building would have to be executed during the winter months. Messrs. Stimpson & Co. have built several fire stations, including that one recently opened at Wandsworth; their work is well spoken of by the Architect, and if the contract be now let to them, substantial progress could be made with the building before the winter begins. We therefore recommend—

"That, subject to a supplementary estimate being submitted to the Council by the Finance Committee as required by the statute, the sum of 300*l.* be added to the amount of 10,260*l.* for which Messrs. Stimpson & Co. undertook to build the East Dulwich station, and that the solicitor be instructed to at once obtain Messrs. Stimpson & Co.'s signature to the contract."

This was agreed to.

Compulsory Purchase of Land.—The same Committee recommended that the Parliamentary Committee should be instructed to insert in a Bill, to be promoted by the Council in the next Session of Parliament, a clause authorising the Council to acquire compulsory property required for Fire Brigade purposes.

Mr. Henderson moved to strike out "Fire Brigade" and insert "public" in the recommendation. Mr. S. Webb seconded the amendment.

After a long discussion, the amendment was carried by 32 to 31. On a division being taken, there voted for the amendment 50, and 47 against.

Mr. Westcott moved to refer the question to the General Purposes Committee for consideration and report.

The Hon. R. Grosvenor seconded.

The Council again divided, when there voted:—For the amendment, 48; against 45.

The recommendation, as altered by Mr. Henderson's amendment was then agreed to.

Condition of the River Thames.—The Report of the Main Drainage Committee contained the following paragraph:—

"At the beginning of last month a letter was received from the Secretary of State, transmitting an extract from a report of the Medical Officer of Health of the Port of London on the condition of the river Thames. The extract was to the effect that the river water, in consequence of a few hot days, had already begun to smell badly in the neighbourhood of the outfalls. This letter was referred to the Chief Engineer and Chemist, who have now presented a report, after sufficient time has elapsed to enable them to judge of the effect produced on the river by the new precipitation works at Crossness, which have been in operation since the second week in June. The report states that over 30,000 tons of sludge per week is now being carried to sea from the two outfalls, and that the river is free from smell arising from sewage, and from the black patches of discoloured water, which formerly were so offensive; they also state that even at low tide no black mud is stirred up in the wake of steamers passing up and down the river. The result obtained in so short a time, appears to us to be very satisfactory, and we have directed that a copy of the report be sent to the Secretary of State."

The Safety of Railway Stations.—On a motion of Alderman Beachcroft, the following resolution was adopted:—

"That it be referred to the Building Act Committee to consider and report on the expediency and practicability of obtaining such an amendment of the Metropolitan Building Acts as to bring the railway stations in London and other structures exempted within the provisions of those Acts and of the Metropolitan Management Act."

After discussing other business, the Council adjourned.

Correspondence.

To the Editor of THE BUILDER.

THE EXAMINATION IN ARCHITECTURE.

SIR.—The term, "Examination in Architecture" is, no doubt, very comprehensive; but is it not, in fact, a very deceptive misnomer? The test is doubtless most admirable of what the knowledge of an average architect or clerk of works should have, but where? where? is the "architecture" so holdly advertised? The worthy Chairman of the Board of Examiners told the Institute on Monday night that 60 per cent. of the candidates were relegated in some way for design; for this we are profoundly thankful; but what of the others, who persevere and wrestle with the design on the one brief day in the Examiner-week, followed by the crotchets of a long *vis-à-vis*? I speak for some, if not many, who would gladly have given three or four days to be properly exercised in those powers of design which their years of study must have evolved.

Let the Council of the Institute, therefore, give this as an instruction to the Board of Examiners, and thus make a real "Examination in Architecture." WILLIAM A. PITE.
5, Bloomsbury-square, July 12.

DEVONSHIRE ARCHITECTURE.

SIR,—I shall feel obliged if you or any of your readers would inform me of any specimens of architecture worth visiting within easy access of Tiverton, Devon. T. F. GREEN.

July 7, 1892.
* The neighbourhood is not very rich in objects of architectural interest. We can recommend our correspondent's attention to Ottery St. Mary; perhaps some other correspondent may give him some further suggestions. Tiverton itself has a fine church.

The Students' Column.

CONCRETE.—III.

III.—HYDRAULIC LIMES (continued).

Calcination.—When limestone containing clay is burnt, the moisture and carbonic acid gas are expelled at a comparatively low temperature, and the clay is split up into its component parts, silica and alumina; the silica is present in the form of hydrated silicic acid (SiH₃O₃), and combines, as far as possible, with the lime to form calcium silicate. Silica frequently occurs in limestones, in the form of sand (quartz and flint), but is then quite insoluble and cannot combine with the lime. Silica in that form (SiO₂) is therefore useless, and analyses ought to say in what form the silica occurs.

Analyses.—There is, of course, a great difference in the composition of hydraulic limes, and it is scarcely possible to classify them according to their hydraulicity. We have compiled the following short table, in order that the composition of a few well-known limes might be seen at a glance and compared with one another and with other limes which may at any time be submitted to the architect:—

TABLE I.—ANALYSES OF HYDRAULIC LIMES.

	Lime.	Silica.	Alumina.	Oxide of Iron.	Magnesia.	Water, Carbonic Acid, &c.	Authority.
Aberthaw Blue Lias	78.45	9.35	6.25	trace	—	5.70	H. Fajja, 1885.
Barnstone	59.61	20.61	6.98	4.01	2.25	6.54	J. B. Dyer, F.C.S.
Warrasworth CWF (Yorks)	53.4	0.56	—	1.4	38.6	1.1	F. Hudson.
Tell (France)*	61.83	{ 14.78a 6.20b	1.61	0.99	1.15	13.73	F. Büsches.

* This is a well-known French lime, much used in different parts of Europe for works in the sea, &c.
a. Soluble silica. b. Insoluble silica.

Grinding.—Many hydraulic limes can only be obtained in lumps as drawn from the kilns; others, however, can be had either in lumps or ground. The lump lime is used chiefly for mortar, as this is, as a rule, ground in a mortar-mill, but the ground lime is preferable for concrete, as a mortar-mill is not usually employed in preparing this material, and some of the lumps of lime are hard enough to resist for a long time, or even altogether, the influence of water, but when finely ground become an energetic part of the lms. It is very seldom, indeed, that any particular degree of fineness is specified by architects or guaranteed by manufacturers. The Aberthaw lime is ground, so that not more than 15 per cent. remains on a No. 30 sieve, that is, a sieve with 900 meshes to the square inch. When we compare this with the fineness of Portland cement, which often leaves less than 10 per cent. on a sieve with 2,500 meshes to the square inch, we cannot fail to notice the great difference between the two, but, of course, there is a great difference in the cost as well. Fineness of grinding is important, for other things being equal, the more finely ground the lime is, the more sand will it bind together; but half-a-loaf is better than no bread, and any grinding better than none.

Weight.—The weight of hydraulic limes varies considerably, some when ground being only a little heavier than powdered white chalk lime, and others being only a little lighter than Portland cement. The extreme limits of weight may be considered to be 60 lbs. and 100 lbs. per struck bushel (about 1.28 cu. ft.), but the weight varies not only according to the composition and degree of calcination of the lime, but also according to the fineness, freshness, &c. The mode of filling the measure also makes a great difference. Lumps of flatkin mountain lime, weigh about 140 lbs. per bushel; the slaked lime obtained from these, weighs only 64 lbs. per bushel.

Slaking.—In all hydraulic limes there is an amount of quicklime (CaO), which has escaped combination with silica and alumina; this amount is very large in the most feebly hydraulic, very small in the most eminently hydraulic. When water is added to the lime, the oxide of lime present in it is converted into hydrate, as already described in the chapter on rich lime, but the action is less violent and slower in proportion to the quantity of silica and other ingredients which the lime contains. Instead of falling to a powder in a few minutes, as is the case with pure lime, lumps of hydraulic limes may not slake in less than one or two days, and some of the best may take a week; there is little or no vapour evolved, and the increase of bulk is in the best kinds, comparatively small. But in all hydraulic limes there is a certain amount of slaking action, and this involves a corresponding increase of bulk. When a limestone produces by calcination a substance which, while possessing hydraulic properties, exhibits no slaking action at all, that substance is known as a natural cement.

It is important that the slaking should be thoroughly effected before the lime is made into mortar, otherwise there will be a danger of the cohesion of the latter being destroyed or impaired by the increase in bulk consequent on the gradual hydration of the quicklime in it after the setting has commenced. We have already said that an excess of clay is detrimental; such a lime, when completely calcined, may set rapidly, but puts it of placed in water will soon exhibit cracks, steadily increasing, or will gradually soften throughout. Sometimes hydraulic lime is kept in a shed for a week or more after being slaked, and the hard lumps which have resisted the action of the water are removed before the lime is mixed with sand in the mortar-mill.

There are two or three ways of slaking hydraulic lime-lumps, but the most common

method is the one known as "drowning." A basin of sand, which may with advantage be coated with lime-paste to render it more impervious, is formed, and the lumps of lime are spread in it to the depth of 6 in. or 8 in. A quantity of water, varying in inverse proportion to the hydraulicity of the lime, is then added. The Halkin Mountain lime requires about 45 gallons of water per ton, and becomes, when slaked, three times the bulk of the lump lime. The Barnstone Blue Lias lime requires about 40 gallons of water per ton. Excess of water reduces the lime to a paste instead of a powder, and is injurious. After the water has been added, the heap is covered with sand or ashes, or with a tarpaulin, in order that the heat may be retained in the mass. This last precaution is important, because hot water is more active than cold in slaking lime, and steam is still more active; the vapour evolved during slaking greatly assists in slaking the harder lumps. The heap should not be disturbed for one or more days, —not, in fact, until the lumps have been as far as possible reduced to a fine powder. This is the object of slaking, for coarse particles, which are frequently the hard, well-burnt part of the lime, may gradually slake after being made into mortar, and so destroy the mortar; while, on the other hand, they may prove, if reduced to powder, the very best part of the lime. The more hydraulic the lime is, however, the more difficult it becomes to pulverise it by slaking; mechanical means must, therefore, be resorted to. The pulverisation may be effected by the manufacturer, in which case the lumps are ground dry, and the lime is sold as "ground lime," or, it may be effected on the building-site by grinding the slaked lime in a mortar-mill. This may be done for three or four minutes dry, then the sand may be added, and in about two or three minutes more the necessary amount of water may be poured into the pan, and the grinding continued for about a quarter of an hour. Sometimes the lime-lumps are ground dry in a mortar-mill. In windy places dry grinding is a wasteful operation. It is advisable to mix even lime ground by the manufacturer in a mortar-mill, as the manufacturers frequently do not grind the lime sufficiently fine. When a mortar-mill is not available, the lumps should be screened from the slaked lime, and thrown away. Gilmore says that fresh water should be used for slaking lime, as sea-water in all cases causes less increase of bulk.

Setting.—The chemistry of setting will be considered hereafter. It will be sufficient to state now that setting and hardening are due mainly to crystallisation, brought about by the action of water on the silicate of lime, and not as in the case of fat limes, by mere absorption of carbonic-acid gas from the atmosphere.

Testing.—The test for tensile strength, which is so important a test of neat Portland cement, cannot fairly be applied to neat hydraulic lime, as its cohesive strength is very small. When lime is tested, therefore, the briquettes contain usually three or more parts of sand. The adhesive strength of hydraulic lime is sometimes tested by uniting two bricks or stones with mortar and ascertaining the force required to pull them apart at a certain age. The resistance of various hydraulic limes to crushing has been occasionally ascertained.

A great many experiments have been made by different persons on the strength of Portland cement, but not many have been made with the various hydraulic limes. One reason, doubtless, is the great difference which exists between different limes and the consequent impossibility of formulating a series of standard tests which shall be applicable in all instances. Hydraulic limes are therefore usually selected empirically, and not from knowledge based on any scientific tests. They take, as a rule, much longer time to harden, and attain less ultimate strength, than Portland cement; the testing of them is therefore more tedious, and, adds Mr. Grant, years would be required to get sufficient tests to form an accurate opinion of their merits.

Tensile Strength.—In an appendix to a paper read by Mr. Grant before the Institution of Civil Engineers, in 1880, he gave the results of experiments made to ascertain the tensile and compressive strengths of various limes and cements, mixed with different proportions of sand. The tests for tensile strength were made on briquettes

having an area at the neck of 2½ square inches (1½ in. by 1½ in.); the sand used in ganging the briquettes weighed 96 lbs. per bushel. Five briquettes were kept in air and five in water, and all were tested twelve months after ganging. The following table of tensile strength in lbs. per square inch has been prepared from that of Mr. Grant* :—

TABLE II.—TENSILE STRENGTH (in lbs. per sq. in.) OF LIMES AND CEMENTS.

No.	Limes and Cements.	Weight per bushel.	Proportion of lime or cement and sand by volume.										
			Neat.	1-1	1-2	1-3	1-4	1-5	1-6	1-8	1-10	1-12	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Grey lime	—	{ Wet	—	—	—	63	57	45	28	—	—	—
			{ Dry	—	—	—	50	44	30	21	—	—	—
2	„ „ Selenitic	—	{ Wet	—	—	—	141	140	87	65	—	—	—
			{ Dry	—	—	—	128	65	55	40	—	—	—
3	Lias lime	—	{ Wet	—	—	—	95	60	47	27	—	—	—
			{ Dry	—	—	—	48	49	32	23	—	—	—
4	„ „ Selenitic	—	{ Wet	—	—	—	132	99	72	80	—	—	—
			{ Dry	—	—	—	79	63	44	52	—	—	—
5	Lias lime	—	{ Wet	—	—	—	81	61	44	34	—	—	—
			{ Dry	—	—	—	40	28	21	13	—	—	—
6	Selenitic lime	—	{ Wet	—	—	—	148	129	84	74	—	—	—
			{ Dry	—	—	—	134	80	72	58	—	—	—
7	„ Rugby lias	—	{ Wet	—	—	—	151	102	77	66	—	—	—
			{ Dry	—	—	—	92	59	33	29	—	—	—
8	„ Aberthaw lias	—	{ Wet	—	—	—	204	147	123	76	—	—	—
			{ Dry	—	—	—	128	84	72	—	—	—	—
9	Rugby lias cement	74	{ Wet	—	—	—	142	110	75	46	—	—	—
			{ Dry	—	—	—	78	63	40	20	—	—	—
10	Portland cement	114	{ Wet	467	334	259	218	171	143	124	102	61	57
			{ Dry	471	339	238	198	164	144	113	53	45	32
11	„ „	120	{ Wet	649	406	245	195	140	124	100	63	56	43
			{ Dry	552	357	213	180	161	131	99	70	52	41

One point will be at once noticed on examining the table, and that is the increased strength attained by all the lime briquettes which have been kept in water. The Portland cements ganged with six or more volumes of sand are also, with one exception, stronger after immersion in water than after hardening in the air, but the two cements, when ganged with less than six volumes of sand, give different results. The following table gives the average increase and decrease per cent. in the strength of the various briquettes caused by being kept in water instead of air. For the sake of uniformity, the averages are all calculated on the four series of briquettes ganged in the same proportions, namely, 1 to 3, 1 to 4, 1 to 5, and 1 to 6, the remaining figures in Nos. 10 and 11 not being considered.

TABLE III.

No.	Limes and Cements.	Difference in strength caused by keeping in water instead of air.
1	Grey lime	36 per cent. increase.
2	„ „ Selenitic	50 „ „ „
3	Lias lime	50 „ „ „
4	„ „ Selenitic	61 „ „ „
5	Lias lime	105 „ „ „
6	Selenitic lime	30 „ „ „
7	„ Rugby Lias	89 „ „ „
8	„ Aberthaw lime	67 „ „ „
9	Rugby Lias cement	85 „ „ „
10	Portland cement	5.6 „ „ „
11	„ „	2.1 „ „ decrease.

Compressive Strength.—A table showing the compressive strength of concrete made with the same limes and cements will be given hereafter.

Adhesive Strength.—According to a circular issued some years ago by the Selenitic Cement Company, the force required to tear apart bricks bedded in mortar was, at the end of twenty-eight days, as follows:—

TABLE IV.

Adhesive strength of limes and cements.

White Chalk lime and sand	(1 to 3)	4½ lbs. p. sq. in.
Barrow Lias	„	9 „ „
„ „	(1 to 4)	6½ „ „
Portland cement	„	(1 to 4) 23 „ „
„ „	(1 to 6)	15½ „ „

Hafkin mountain lime made into mortar with one part of sand and one of ashes, has been found to have an adhesive strength of 28.7 to 34 lbs. per sq. in. at 168 days, tested with bricks as above.

* Proceedings Inst. C.E., vol. lxi. (1879-80), part iv.

GENERAL BUILDING NEWS.

ASHTON INDUSTRIAL HOME.—This building, of which Mr. James Crombie, A.R.I.B.A., Brixton, S.W., is the architect (selected in competition), will be carried out by him in conjunction with Mr. E. J. Andrew, of Preston; the works are to be commenced immediately.

It is situated in the High-street, the spire being 123 ft. in height. The church is seated for 700, the total estimated cost being 4,200l.

FREE LIBRARY, ABERDEEN.—On the 5th inst. the new public library at Aberdeen was opened. The building is situated on the new Rosemount Viaduct, and has three principal rooms,—the lending library, the reference library, and a public reading-room. The architect was Mr. Alexander Brown, Aberdeen, his design having been selected in competition. The buildings have cost about 10,000l.

ENLARGEMENT OF HOSPITAL, LEAMINGTON.—On the 9th inst., the Right Hon. Arthur Wellesley Peel, M.P., Speaker of the House of Commons, opened a new wing of the Warneford, Leamington, and South Warwickshire Hospital and Bathing Institution, which has been added to the main building at a cost of 14,000l. The extension provides accommodation for another thirty in-patients, and comprises two large wards, two small isolation wards, several apartments for nurses, as well as store-rooms, larder, kitchen, and an operation-room. A fresh set of heating apparatus has been introduced into the main block, and is designed to serve for the whole building. Special attention, it is stated, has also been given to the sanitary arrangements. The architect was Mr. Keith D. Young, of London, and the builder was Mr. J. S. Kimberley, of Banbury.

NEW CHURCH, UPTON CROSS, ESSEX.—Lady Cowper on the 30th ult. laid the foundation stone of the new permanent Church of St. Peter, Upton Cross. The new church, which has been designed by Sir A. Blomfield, will take the place of the present iron church, and it will seat about 800. The contract for the building is 5,900l.

NEW INFIRMARY, LEWISHAM. The foundation-stone of the new Lewisham Infirmary, adjoining the Lewisham Union Workhouse, was laid on the 2nd inst. by the Bishop of Lichfield. The infirmary will be built with grey stock bricks, with red facings and some Portland stone in front, and will be divided into four blocks, two being allotted to the patients, male and female, the other two being respectively reserved for the administration and staff quarters. All the blocks will be connected by a corridor running down the centre, and they will each be two stories high, except the administration block, which will be only one story. The centre of the building will be marked by a dome, and the length of the frontage will be about 300 ft. The infirmary is being built at a cost of 51,000l., exclusive of engineering fittings, furnishing, &c., by Messrs. W. Johnson & Co., builders, of Wandsworth-common, to the designs of Messrs. A. & C. Harston, of Leadenhall-street, and is intended for the accommodation of 372 poor sick patients.

NEW CHURCH, HITHER GREEN, KENT.—On the 2nd inst., the Countess of Dartmouth laid the foundation-stone of the permanent church of St. Swithun, Hither Green, Kent, the second of the three churches comprised in the scheme of the Lewisham Church Extension Association. The new church, which is being erected from the designs of Mr. Ernest Newton, of Bloomsbury, by Mr. S. C. Parmenter, of Baintree, will be in the fourteenth century style faced with red brick and with Bath stone dressing. It is to seat 600 persons. The present contract is rather under 5,000l., it being decided not to go further present than with the erection of the nave and north and south aisles and the west gable, leaving the chancel and chancel-aisles to be the subject of a future contract. The church will have an open timbered roof covered with green slates, the windows will be filled with plain glass, while over the main entrance the place is reserved for the erection covered with lead. When the whole scheme is carried through the total length from east to west will be 120 ft.; at present the dimensions are as follows:—Nave, 66 ft. long by 30 ft. wide; north aisle, 66 ft. by 12 ft. 3 in.; south aisle, 66 ft. by 19 ft.; extreme exterior height to the apex of the gable, 58 ft.

SANITARY AND ENGINEERING NEWS.

THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.—The annual meeting of this Association is to be held in Bury, Lancashire, on Thursday, Friday, and Saturday next, July 21, 22, and 23. The new President is Mr. J. Cartwright, Mem. Inst. C.E., F.S.I., Borough Engineer of Bury. The members will assemble on Thursday, the 21st, in the Town-hall, kindly lent for the occasion by the Earl of Derby, K.G., where they will be received by the Mayor (Mr. Councillor Ashworth). After the consideration of the annual report and the presentation of premiums, Mr. W. G. Spoones will move:—“That in view of the fact that the Association now numbers over 500 members, the number of elected members on the Council ought to be increased from 12 to 18, and this general meeting begs respectfully to request the Council to take such steps as may be necessary to have the Articles of Association amended in order to carry out this Resolution.” Mr. Cartwright will subsequently deliver his Presidential Address. After luncheon, the following papers will be read and discussed, viz.:—(1) “Factory and Workshops Act, 1891,” by Mr. H. P. Bounois, Mem. Inst. C.E., City Engineer, Liverpool. (2) “Electric Traction,” by Mr. J. H. Cox,

WESLEYAN CHAPEL, CHURCH PENTON, YORKSHIRE.—On the 5th inst. the foundation-stones of a new Wesleyan Chapel were laid at Church Penton, near Leeds. The building, which is to be constructed from the plans of Mr. F. W. Dixon, architect, Oldham, is to cost about 1,500l. It comprises a chapel, with sitting accommodation for 200 persons, and a schoolroom for 140 scholars. By an arrangement of sash-windows which separate the two rooms they can, when requisite, be made into one. In addition, there will be two class-rooms, a minister's vestry, and the usual conveniences. The structure is to be faced with wall-stones, and the woodwork will be varnished pitch pine. The contractors are—Masons' work, Messrs. Thompson & Son, Leeds; joiners' work, Messrs. Atkinson & Sons, Leeds; slater, Mr. Dawber, Hull; plumbing, &c., Mr. Snowden, Ossett; and plastering, Mr. William Lonsdale, Malton.

PROPOSED ALTERATION OF THE LUTON PLAIT HALL, BEDFORDSHIRE.—On the 6th inst. a Local Government Board inquiry into the application by the Corporation of Luton for power to borrow money to carry out the alterations proposed to be made upon the Waller-street Plait Hall was held in the Council Chamber at the Town Hall by Major-General C. Phipps Carey. To cover the expense of converting the hall 3,700l. is to be borrowed, and 250l. additional for covering in the yard adjoining with the iron roof to be removed from the building itself. Councillor Huckleby gave a short sketch of the history of the building, showing it was no longer required for a straw-plait market, and that there was no possibility of its being again required for that purpose. Mr. Cox, of Messrs. Cox & Marmon, of Liverpool, whose plans have been accepted, and Mr. Rosson, the Borough Surveyor, then submitted plans and drawings showing what it is proposed to do. It was stated that the tender for executing the work amounted to 3,150l., Mr. G. Smart being the contractor.—The question of roofing the highway depot was next gone into. The Commissioner afterwards visited the premises along with the members of the Corporation.

PARISH CHURCH, EARLSTON, BERWICK.—The new parish church of Earlston, the foundation-stone of which was laid in April last year, was opened on the 6th inst. The church, built from plans by Messrs. Hardy & Wight, architects, Edinburgh, contains sittings for about 700 people. The building has been erected at a cost of about 3,000l., and occupies the site of the previous parish church.

NEW BRIDGE ACROSS THE DON.—On the 9th inst. Lord Provost Stewart, of Aberdeen, opened a granite bridge which has been erected across the Don at Pterley, a point half-way between the villages of Burray and Woodside. The bridge is of five spans, the three centre ones measuring 50 ft., and those which rest on the bank at each side 25 ft.; the width is 32 ft., and the approaches 20 ft. Mr. P. M. Barnett, C.E., was the designer of the structure, the contractor being Mr. James Leith, Aberdeen.

FREE CHURCH, MOPPAT, DUMFRIES.—The new Free Church at Moppat, the foundation stone of which was laid in August, 1890, was opened on the 6th inst. The church, which has been erected from plans prepared by Mr. D. B. Burnie, architect, Edinburgh, is in the Early English style, and is built of whinstone from the quarry near Moppat Well, with red freestone facings from Cornecock Quarry.

Mem. Inst. C.E., Borough Engineer, Bradford. The members will then proceed in brakes, provided by the Corporation of Bury, to visit Fleet-street and Market-street to see examples of wood pavement in construction; Iwell Forge (by kind permission of Messrs. Webb); Lowercroft Bleach Works (by permission of Mr. Henry Whitehead); the Whitehead Recreation Ground; and the Railway Sidings in course of construction connecting the Corporation Gas Works with the Main Line of the L. & Y. Railway Company. In the evening the annual dinner will be held in the Town-hall. On Friday, the 22nd inst., there will be a meeting at 10.30 a.m. for the reading and discussion of the following papers at the Town-hall:—(1) "Sewage and its Purification," by Mr. C. A. Burghard, Ph.D., &c., Lecturer and Examiner of Owens' College, Victoria University. (2) "Rivers Pollution and Rivers Purification," by Mr. H. A. Roehling, C.E. (3) "Utilisation of Water Power," by Mr. H. G. Coates, C.E. (4) "The Ordnance Survey" (with diagrams), by Mr. H. T. Crook, C.E. At 1 p.m. the party will lunch with the Corporation of Bury under the presidency of Ald. C. Brierley, Deputy-Mayor. In the afternoon there will be visits, under guidance of special leaders, to the following places of interest:—1. Messrs. Wright's Paper Works. 2. The Felt Hat Manufactory of Messrs. Lucas. 3. The Corporation Store-yard, Stables, Workshops, Destructor, and Exhibits. 4. The Peel Mills. Possibly, also arrangements will be made to visit the engineering works of Messrs. Mather & Platt, Salford, electricians, engineers, and machinists, and Messrs. Musgrave, Bolton, engineers, millwrights, and boiler makers. In the evening the members are invited to Mr. Albert John Paves to attend a garden party. On the last day of the meeting, Saturday, July 23, the party will visit Bacon, where members will be conducted in brakes provided by the Corporation of Bury to Sir Thomas Brooks', Baronet, extensive Millstone Grit Quarries for the production of setts, flags, kerbs, &c., when Mr. H. Bolton, Assistant Keeper in Geology at the Owens' College Museum, Manchester, and author of the "Geology of Rossendale," has promised to give a short address on the Geological features of the district. The members will afterwards proceed to "Clough Bottom" reservoir in course of construction (via Bacup), and will lunch with the Corporation of Bury at White Lee House, "Clough Bottom" reservoir, under the presidency of Councillor Bentley, Chairman of the Water Works Committee. After luncheon they will inspect the works in progress, with description by the engineer (the President), and a Geological Sketch by Mr. H. Bolton, and will then return to Manchester.

IMPROVEMENTS AT TORQUAY, DEVON.—At the Torquay Town-hall on Wednesday last, Mr. Arnold Taylor, Local Government Board Inspector, held an inquiry in reference to the proposal of the Local Board to borrow the sum of £2,000, for street improvements, public walks, and pleasure grounds, and for a promenade and raised terrace walk along the sea front; £2,452, for works of sewerage, and 500l. for providing public conveniences. There was no opposition, and after the plans had been explained by the Engineer and Surveyor (Mr. H. A. Garrett, Assoc. M. Inst. C.E.) the Inspector visited the various sites of the proposed works and subsequently intimated that he would in due course make his report to the Local Government Board.

THE SANITARY INSTITUTE'S EXAMINATIONS.—At an Examination held by this Institute at Cardiff on Friday and Saturday, July 8 and 9, seven candidates presented themselves as Local Surveyors and thirty-three as Inspectors of Nuisances. The following four candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Local Surveyors, viz., Messrs. John Daye, E. R. Ridgway, W. I. Williams, and J. A. Wilson; and twenty-one candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances.

FOREIGN AND COLONIAL.

FRANCE.—It is stated that the *Journal Officiel* will publish very shortly the decree relative to the proposed Exposition Universelle of 1900, as well as the order instituting the Commission charged with the organisation of the exhibition.—The Committee of the National Society of Fine Arts has decided, by a formal vote, that there is no reason for entering into negotiations with the Society of French Artists with a view to the fusion of the two societies.—Meissonier's house, on the Boulevard Malesherbes, has just been sold by auction. It was knocked down to his son, M. Charles Meissonier, at the sum of 800,000 fr. This sale puts an end to the project for a museum proposed by the widow of the celebrated painter, which the Society of French Artists has been commissioned by the Municipality of Paris to execute two allegorical paintings intended to replace the portraits of Napoleon III. and of the Empress Eugénie which formerly decorated the foyer of the Châtelet theatre, and which were removed after the fall of the Empire.—The Ministry of War is about to construct a new wing to the Caserne Duplex, adjoining the Ecole Militaire.—A Committee has just been formed, in the

Seventeenth Arrondissement, for erecting a monument to the memory of Anatole de la Forge, a politician who recently committed suicide.—The municipal authorities of Paris propose to create, at Belle-Ile-ou-Sea, a maritime reformatory school for refractory and undisciplined children.—There has just been inaugurated a very important new group of school buildings in the Rue Vieq-d'Azir.—The Minister of Public Instruction and Fine Arts has just commissioned the sculptor Henri Bouillon a marble bust of the celebrated Dr. Guillotin, who gave his name to the instrument used for the execution of those condemned to death. The bust is to be placed in the Tennis-Court at Versailles.—The Palace of Biarritz, formerly a villa residence of the Empress Eugénie, is to be put up to auction, with a reserve price of 400,000 fr., by the Chamber of Notaries of Paris.—The Municipal Council of Rouen has just voted a sum of 20,000 fr. by way of opening a subscription for the erection of a national monument to Joan of Arc on the Place Verdre, in front of the Palace of Justice of that town.—The Ministry of War, in view of the possibility of the bombardment of the port of Havre by a hostile fleet, has decided that a new fort shall be constructed not far from that town, on the coast between St. Adresse and Octeville.—The monument erected at Anzin in the memory of the miner Fontaine, and which was inaugurated on Sunday last, is the work of a young sculptor born at Anzin, M. Theunissen, who obtained the second Prix de Rome.—The Municipal Council of Metz (Ardennes) has decided to postpone until next spring the inauguration of the statue of the Chevalier Bayard, which was fixed to take place at the end of September. On the other hand, the beginning of October has been decided upon for the inauguration at Givet (in the same Département) of the statue of the celebrated composer Méhul.—A committee has just been formed at Montfort l'Amaury with the view of erecting, in that town, a statue of François Guesnay, surgeon-in-ordinary and physician to Louis XV., who died in 1774.—The death is announced of the talented landscape painter M. Brioso de Warville, born at Sens (Yonne) in 1818. He had been awarded many medals at different exhibitions. The Prefect of the Seine has just appointed a Commission charged with making arrangements for the participation of the City of Paris and of the Département of the Seine in the International Exhibition at Chicago.—The Museum of the City of Paris has just been enriched by a fine composition by the Roman painter Cazes, given by his widow. It was exhibited in the *Salon* of 1840, and is represented the "Massacre of the Innocents." It is in contemplation to organise, for 1893, at the Champ de Mars, a great international and retrospective Theatre Exhibition, including the Greek theatre, the Roman theatre, the Mystery Plays of the Middle Ages, the theatre under the Renaissance, the theatre of the seventeenth and eighteenth centuries, and the theatre of the nineteenth century, down to our own days. This important exhibition, due to the initiative of M. Gailhard, formerly director of the Opera, will involve the transformation of the various buildings on the Champ de Mars into *salles de spectacles*. Several theatres will be built in the garden, and in the great Machinery Gallery will be reproduced a portion of the Grand Canal at Venice, ploughed by gondolas, bordered by palaces, and crossed by bridges. The outlay is estimated at 20,000,000 fr.

STUTTGART.—The great competition for the fresco and sculptural decoration of the new National Museum at Stuttgart has been decided. Some forty designs were sent in, and nine prizes, varying in value from 150l. to 25l. were awarded. Professor Keller (Carlsruhe) obtained the first prize for his design of the fresco work, whilst two Berlin sculptors, Eberlein and Handraker, won the first two prizes for the sculpture. It may be noted that no Berlin painter was amongst the premiated competitors for the fresco work, they were all South Germans.

BERLIN.—The proposed International Exhibition is the general topic of conversation in all technical circles. Although there is much feeling in favour of such an exhibition in the capital, it is doubtful if the country as a whole will be so very pleased to have one. As yet it is very doubtful if the show can be arranged; if it can, 1893 will probably be the year decided upon.—Of the many competitions opened for the purpose of obtaining suggestions for the selection and laying out of a suitable site, one promoted by inhabitants of the northern district will deserve attention; the prizes offered are 1500l. in amount. The municipality have opened a competition for a philanthropic purpose. They have offered prizes of 50l., 30l., and 15l. to carpenters who will turn out the best suites of furniture (1) for a tenement consisting of two sitting-rooms, a bedroom, and a kitchen; and (2) for a similar tenement with only one sitting-room, the price of the sets not to exceed 450l. and 300l. respectively. In awarding the prizes, the assessing jury of eleven is to specially consider the practicality, durability, and design of the furniture. There will an exhibition of the work sent in.—The question of extending the city boundaries has again come to the front. The proposed lines will cause Berlin to have a population of about three millions.—The sum paid by the municipality for damage done to private property during the spring

riots amounts to 830l.—Quite an extraordinary number of first class and minor architectural competitions have been lately opened, and hence much activity prevails in the *adverts*. We would specially notice one for a large synagogue in Goettingen, and one for a public library in the old Hanse city Bremen. Competitors for the great Dresden terminus station competition have had an extra month added to the time they had at their disposal, and, hence, there will be no decision until October.

BAVARIA.—The proposed new home for Bavarian National Arts and Crafts Collections, which is to be erected at Nuremberg, will have its foundation stone laid this month. There will be some 50,000l. at the disposal of the architect, Herr von Kramer, of which sum 40,000l. have been voted by the Bavarian Government.—The architectural room at this year's so-called "International" Art Exhibition at Munich is a very poor one, in spite of the efforts of the managing committee and of the fair promises they had received. There are only fifty-three numbers in the catalogue; nineteen of these are attached to works of Polish architects, the only section of the profession that can boast of a decent representation. The miserable state of the architectural rooms in Berlin and Munich is solely due to the apathy of our German colleagues.

MISCELLANEOUS.

TERRIBLE FIRE AT ST. JOHN'S, NEWFOUNDLAND.—Telegraphic despatches to the *Times* state that on the 10th inst. two-thirds of the City of St. John's were devastated by a terrible fire, commencing, it seems, in a stable, in the vicinity of which there were a great many wooden houses. The Anglican Cathedral, built a few years ago, from the designs of Sir Gilbert Scott, has, in common with many other public buildings, been entirely destroyed. We gave a view and plan of the Cathedral in the *Builder* for January 22, 1881.

DISSOLUTION OF PARTNERSHIP.—The partnership between Professor Roger Smith and his son and Mr. Arthur J. Gale has been by mutual consent dissolved, and in future Mr. Gale will practise at No. 4, Serjeant's Inn, Fleet-street, while Professor Roger Smith and Mr. R. Eley Smith will continue their practice at their present address as Messrs. Roger Smith & Son.

THE WORLD'S RAILWAYS.—Mr. Ernst Rohl, in his investigation of the railway statistics of the world, finds that in Europe there are 2.3 kilometres of railway to every 100 square kilometres of area, and 0.2 kilometres for every 10,000 inhabitants. In the United States the corresponding figures are 3.3 and 39.8 kilometres. In Great Britain there are 10.2 kilometres, and in Belgium 17.5 kilometres, for every 100 square kilometre area. The total length of railways in the world is estimated at 600,000 kilometres, or 375,000 miles; that is, about fifteen times the equatorial circumference of the earth. The average cost of European railways is estimated at 55,000l. per mile, and the cost of all the railways in the world at 5,423,000,000l. sterling.

DEMOLITION OF A HISTORIC BUILDING AT LINTHGHOW.—Workmen are at present engaged pulling down in Lintghow an old structure, around which cling some interesting historical associations. The building, which was one of the most prominent in the town, was known as "Drummond's Lodging," so named, it is believed, by the property having at one time belonged to the Drummonds of Hawthornden. It is also supposed to have been used as a school after the Burgh School had been destroyed by Cromwell's soldiers. It is intended to construct a new block of buildings on the same site.—*Glasgow Herald*.

PROPOSED STREET IMPROVEMENTS, EDINBURGH.—At the meeting of the Edinburgh Town Council on the 12th inst., the Lord Provost's Committee submitted a report by the Burgh Engineer (Mr. Cooper) as to the probable cost of the proposed widening and improvements at Bristo-street. According to the report, the proposed improvement, which is expected to cost 23,000l., consists in the acquisition and removal of a group of nine tenements, containing seventy-seven houses and ten shops, situated on the west side of Bristo-street and Charles-street, and extending from Teynton-place to the lane in rear of the north side of George-square, and occupying an area of 2,536 superficial yards. The removal of these buildings would open up the thoroughfare of Bristo-street, where at present it is, at its narrowest, only 29 ft. 11 in. in width, including footpaths, with a very considerable and somewhat congested traffic, and at the same time expose to view the M'Ewan Academic Hall, the University Union, the School of Music, and the back part of the Medical Schools, and afford suitable approaches to these buildings. The buildings situated between the Students' Union and the School of Music,—viz., the Park-place Lecture-rooms and the Jewish Synagogue,—would also require to be taken. The Lord Provost said in this scheme, after discussion, were adopted by the Council, they would require to promote a Bill, for there were too many interests involved to deal with them privately. Mr. Sloan thought, in consideration of the great improvement that would be made to the adjacent property, some contribution might be got from these proprietors. After some further conversation, the subject was allowed to lie over.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv, vi, vii, & viii. Public Appointments, p. xii.

REPERDS, ST. JAMES'S CHURCH, HIGHER BROUGHTON, LANCAIRESHIRE.—A stone reperdo has just been erected in St. James's Church, Higher Broughton, in memory of the late Dr. Theodore Drayton Grimke.

STATUE, DALLINGTON CHURCH, NORTHAMPTONSHIRE.—The Church of St. Mary, at Dallington, has just received an addition to its reperdos in the shape of a sculptured statue of St. James-the-Great.

THE ENGLISH IRON TRADE.—In but few of the English iron trade centres is any change in the depressed condition of the market apparent, and the progress of the elections throughout the country seems the prevailing topic on the various exchanges.

IMPROVEMENTS AT BILSTON.—Major-General Carey, of the Local Government Board, held an inquiry at the Town-hall, Bilston, on Tuesday last, the Commissioners having applied for permission to borrow £9000 for new roads, and £3,000 for new stalls in the Market Hill, and for the electric lighting of the same.

OPENING OF ROSEBERY AVENUE.—This new street was formally opened on Saturday afternoon by the arena, named in compliment to the first chairman of the London County Council, is 1,173 yards in length, by 60 ft. wide, and will eventually be flanked by shops.

underground pipes. Dwellings for people removed from partially dilapidated property had been provided in the neighbourhood. Mr. Hutton, Deputy Chairman of the Council, also addressed the assembly present, and formally handed over the street to the local authority, the Vestry of Clerkenwell.

CAPITAL AND LABOUR.

BRICKMAKERS' STRIKE IN THE WEST LONDON DISTRICT.—We regret to learn that this strike still continues, and that there now appears to be no likelihood of its being brought to a termination before the end of the present brickmaking season.

STRIKE IN THE BUILDING TRADE, SHEFFIELD.—According to the Sheffield Daily Telegraph, another strike has occurred in the local building trade. It again affects the masons. All the stone-workers in the employment of Messrs. Graham & Sons, at present engaged on the extensions to the Central Schools, have ceased work, and have consequently thrown the bricklayers out of employment as well.

LOCK-OUT BY THE BOLTON BUILDING TRADE.—The failure to effect a settlement on the 8th inst. of the Bolton plumbers' dispute, which has now existed for ten weeks, resulted on the 9th inst., says the Leeds Mercury, in all the federated building trades in the town being locked out, and accordingly about 1,000 men, including joiners, bricklayers, masons, painters, plasterers, and

excavators, left work at noon. This was in accordance with the resolution of the Master Builders' Federation, who gave the operative plumbers up to the 9th inst. in which to come to terms, and failing this, a lock-out. The two points in dispute are as to the time of starting work in winter, and the allowance for country money. During the progress of the strike numerous attempts have been made to arrive at a settlement, and the masters, it is said, have made concessions which have not been accepted. Lately the Operatives' Federation have called in, and have supported the men in their claims.

THE CARPENTERS' STRIKE AT MERTHYR.—After a duration of six weeks, the strike of operative carpenters and joiners at Merthyr has been settled, those masters who had stood out having consented to grant the 7½d. an hour which the men demanded.

MEETINGS.

SAURDAY, JULY 16. Liverpool Engineering Society.—Visit to the Liverpool Corporation Refuse Destructor and the Liverpool Cold Storage Company's Works.

WEDNESDAY, JULY 29. Builders' Foremen and Clerks of Works' Institution.—Half yearly meeting. 8.30 p.m.

THURSDAY, JULY 21. Incorporated Association of Municipal and County Engineers.—Annual Meeting, to be held in Bury, Lancashire. Presidential address by Mr. J. Cartwright.

FRIDAY, JULY 22. Architectural Association.—Special General Meeting to consider the validity of the late election. 7.30 p.m. Incorporated Association of Municipal and County Engineers.—Annual Meeting, Bury, Lancashire (continued).

SATURDAY, JULY 23. Architectural Association.—Visit to the new Lunatic Asylum erected by the London County Council at Claybury, Essex, by permission of the architect, Mr. G. T. Hine. Meet at Woodford Station, G.E.R., 5.7 p.m. Incorporated Association of Municipal and County Engineers.—Annual Meeting, Bury, Lancashire (continued).

LONDON—For erecting new lecture-hall and alterations to Park Chapel, Church End, &c. Mr. Alfred Conder, architect, Palace-chambers, 8, Ridge-street, Westminster. Quantities by Mr. E. J. Paine, F.R.S., of 11, Great James-street, Bedford-row—

N. Alington		Total.
J. Grover & Son	44,290	41,041
Zove Bros.	4,600	1,600
Wagner & Son	4,383	393
G. S. S. Williams & Son	4,100	984
J. Chapman	4,032	973
L. Lawrence & Sons	4,257	812
J. Greenwood	4,225	812
Edmund & Co.	4,103	839
E. Toms	4,121	837
Mattock Bros.	4,000	834

LONDON—Accepted for sanitary work, ventilation and improvements to Hospital Frenches, "Sunshine," Upper Avenue-road, N.W. for Miss Davidson—

Grosvonts & Co., Limited	41,142
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LONDON—Accepted for decorative work at Chislet-road, West Hampstead, for Mr. E. Fitzal—

Grosvonts & Co., Limited	42,338
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LONDON—For the erection of a Dispensary in Abbeystreet, Bermondsey, for the Guardians of the Poor of the St. Olave's Union. Messrs. Newman & Newman, architects, 21, Tully-street, London Bridge. Quantities by Mr. W. T. Pithing—

J. Bentley	42,337	0	H. Fankner	42,498	0
A. Collett	2,977	0	J. O. Richardson	2,469	0
W. A. H. Castle	2,508	0	T. Hall	2,528	0
N. Kellert	2,098	0	C. Denzil Brown	2,342	0
J. Bullers	2,593	0	Balsam Bros.	2,279	0
W. Wells	3,392	0			

LONDON—Accepted for repairs, &c., at the United St. Saviour's Almshouse, Houndsditch, New-road, Mr. H. Ruzicka-Langston, architect, 9, Great James-street, Bedford-row, London—

Chas. Down, Crofton	4,894	0
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B. Finch & Co., London—

2384	0
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Ventilation to Chapel and Vestry.
The Cinema Ventilating Company 465 0 0

Jones & Willis—

465	0
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LONDON—Accepted for new workrooms, &c., at St. Maddox-street, W., for Miss Maria. Mr. Thomas J. B. Hollins, architect, Besouthe, Hants—

David Proser, Charlotte-street, W.	4,263
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LONDON—For rebuilding shops, Nos. 51 to 61, High-street, Stoke Newington. Messrs. T. H. Brown, architects, 11, Abchurch-lane, London. Messrs. Saville & Martin, architects, Duncy House, Aldershot-street, Strand, W.C. Quantities by Mr. E. J. Sadgrove, 22, Surrey-street, Strand, W.C.—

S. Goodall (accepted)	41,528
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[Full list given last week.]

LONDON—For the re-erection of the "Flying Horse" public-house, No. 6, Oxford-street, and the property adjoining, comprising Nos. 4, Oxford-street, and Nos. 11, 12, and 13, Butler's-court, Tottenham-court-road, W., for Messrs. H. & R. Baker, Messrs. Saville & Martin, architects, Duncy House, Aldershot-street, Strand, W.C. Quantities by Mr. E. J. Sadgrove, 22, Surrey-street, Strand, W.C.—

Kirk & Randall (accepted)	412,120
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[Full list given last week.]

LONDON—For a new warehouse, Clapham-road, for Messrs. Alfred & Abler. Mr. M. Beaton, architect. Quantities supplied—

Rose	4,800	0	Burnall & Sons	41,698	0
W. Smith	1,731	0	J. Hooper	1,611	0
E. & H. Higgs	1,770	0	Holliday & Greenwell	1,440	0
Bryant	1,711	0	Archer	1,375	0

NEW SWINDON—For the erection of new Sunday-schools in connection with St. Mark's Church, Mr. Walter Whitson, architect, 44, New-street, Stoke Newington, N. Quantities by Mr. W. Courtney Fagg, 23, Eastbank, Stamford-hill, N.—

Hall	41,339	0	Hecks	41,000	0
Williams	4,135	0	Martin & Co.	3,027	0
Wiltshire	4,050	0			

NEWPORT (Mon.)—For the erection of a block of offices, Marshwood, Newport, Mon. for Mr. H. J. Parnall, J.P., Mr. W. H. Watling, architect, Council-chambers, Newport, Mon. Quantities by Mr. J. D. Whitaker, Newport, Mon.—

J. Wilkins	4,869	0	J. Francis & Son	4,737	0
J. Linton	859	0	Charles Lock, Caerleon	857	0
E. Richards	859	0	road, Newport	755	0
W. Blackburn	854	0			

NEWPORT (Mon.)—For the erection of metal stamping works, Marshwood, Newport, Mon. for Messrs. A. Davies & Co., Mr. W. H. Watling, architect, Council-chambers, Newport, Mon. Quantities by Mr. J. D. Whitaker, Newport, Mon.—

J. Wilkins	41,659	0	Win. Price	48,775	0
J. Linton	920	0	H. Shaen	857	0
J. Wilkins	914	0	Charles Lock, Caerleon-road	850	0
E. Richards	912	0	Newport	850	0
J. Francis & Son	920	0			

BEDDITH (Worcshire)—For home and stabling, for the Rev. Canon Newton, of Reddit B. Mr. Temple L. Moore, architect. Quantities by Mr. John B. Lofting, 4, Great Queen-street, Westminster, S.W.—

E. Giles	410,249	0	Hulls & Sons	48,709	0
E. Thompson	9,367	0	Barnley & Sons	8,560	0
John Bowes	8,716	0	Smallwood & Co.	8,500	0
James Smith & Sons	8,587	0	Farnell & Sons	8,411	0
Henry Lovatt	8,501	0	Jas. Longley & Co.	8,358	0
Sapote & Sons	8,771	0			

ST. LEONARD'S-ON-SEA—For additions to carpet-beating warehouse at St. Leonard's-on-Sea, for Messrs. Goss & Son. Messrs. Elworthy & Son, architects, St. Leonard's—

Moon & Garner	4,437	0	0	Taylor Bros.	4,719	0	0
H. E. Crutenden	4,418	0	0	W. Waller	4,601	0	0
D. Suow	4,468	0	0	White	4,413	0	0
Edridge & Crutenden	4,811	0	0				

* Accepted.

ST. LEONARD'S-ON-SEA—For erecting detached residence on the Pinnac estate. Messrs. Elworthy & Son, architects—

A. H. White	41,573	0	Edridge & Crutenden	1,228	0
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* Accepted.

SUNDERLAND—For the erection of new schools (St. Columba), Southwick. Mr. Frank Cava, architect, 22, Fawcett-street, Sunderland—

W. Dawson	42,317	0	1	P. F. Shotton	41,349	0	0
J. W. White	4,253	0	0	D. & J. Jackson, Son	285	0	0
G. H. Hodgson	4,358	0	0	Shardan (accepted)	4,200	0	0
J. Arncliffe	4,415	0	0	W. B. Cooper	4,229	0	0

T. TONBRIDGE (Kent)—For three 12-ft. wells, for the Tonbridge Waterworks Company, Ltd.—

T. W. Newton Crw.			Richd. D. Batchelor	4,210	8	3	
ford	4,900	16	0	Edward Farnock	285	0	0
Wm. Hickmish	547	4	0	Crawford	222	2	6
S. F. Baker & Son	650	10	0	G. J. Jones	180	5	3

TOTNES (Devon)—Accepted for rebuilding two cottages, &c. Michelcombe for the Hon. R. Dawson, J.P., Mr. W. M. Talbot, architect, Totnes, Devon—

Frank Esterbrook, Holme Ashburton	4,221	13	0
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VENTNOR (I.W.)—For the erection of a ball room and a library at "Ean Grove," Ventnor, for Mr. Lionel A. Olive. Mr. John G. Leamy, architect, Ventnor. Quantities by Messrs. S. H. I. N. (we cannot insert such items without the amount).—A. Pugh (we must insert assistants)—H. R. H. (You send neither name nor address. If you comply with our rule in that respect we may be able to advise you.)

A. S. Sains	4,322	0	0	H. Ingham & Sons	4,875	0	0
D. Day & Son	705	0	0				

* Accepted.

TO CORRESPONDENTS.

"Forward" (we cannot enter into matters of that kind; it is no part of our business)—Maudslayi Arbitration Case (no name or address of sender)—T. R. E. (Isabel)—E. L. N. (we cannot insert such items without the amount).—A. Pugh (we must insert assistants)—H. R. H. (You send neither name nor address. If you comply with our rule in that respect we may be able to advise you.)

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The Builder.

Vol. LXIII. No. 2531.

JULY 23, 1892.

ILLUSTRATIONS.

Interior of St. Stephen's Chapel, Westminster.—Restored, from Ancient Authorities, by Mr. H. W. Brewer	Double-Page Photo Litho.
Trosley Towers, Kent: Interior of Grand Hall.—Mr. E. R. Robson, Architect.....	Double-Page Photo-Litho.
Battersea Polytechnic Institute.—Mr. E. W. Mountford, F.R.I.B.A., Architect.....	Double-Page Ink-Photo.
Stables: Pewsham, Wilts.—Mr. C. E. Ponting, Architect.....	Two Single-Page Ink-Photos.

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The Building and Decoration of a Royal Chapel.



THE "Royal and Collegiate Chapel of Our Lady and St. Stephen within our Palace at Westminster" is so frequently referred to in documents dating from the reign of Edward I.

to that of Edward VI., that all who are interested in Medieval architecture must feel some desire to know what kind of structure it was which received so much care and attention at the hands of so many of our English kings. Fortunately, the documentary evidence concerning the building and decoration of this chapel is very voluminous and interesting. In the Public Record Office, under the "Q. R. Rolls Ancient Miscellanea," bundles 870 to 873, will be found a number of accounts dating from the nineteenth year of Edward I. to the thirty-fifth of Edward III., including the rolls of Robert de Hillum* and Walter de Weston. These rolls are the accounts for work done in connexion with St. Stephen's Chapel, Westminster, and the Palace within the Tower of London. They are, for the most part, fragmentary, and do not appear to include the whole series which has been referred to by Smith, Topham, and Brayley; but the mass of evidence, taken together, is highly interesting, as it not only gives a great insight into the manner in which this most remarkable edifice was erected, but also shows what wages were earned by the various craftsmen in the thirteenth and fourteenth centuries, and perhaps, what is even more remarkable, preserves the names of English painters whose very existence seems to have escaped observation. These documents will for the most part be found published and translated in Smith's "History of Westminster," 1807; Brayley's "Ancient Palace of Westminster," 1836; "an Account of St. Stephen's Chapel" published by the Society of Antiquaries in 1795, and an additional series of plates and descriptions published by the same society in

1805. There are also documents relating to the establishment of the collegiate foundation given at length in "Dodsworth's and Dugdale's Monasticon," 1655. Now although this mass of evidence and material is very extensive, yet it is by no means easy to piece it together, and draw from it correct deductions as to exactly what was done by these various sovereigns; but we shall attempt, by comparing the various accounts to which we have referred, to get at something like a connected narrative of the works executed at St. Stephen's Chapel during the thirteenth and fourteenth centuries.

There can be no doubt that St. Edward the Confessor erected a chapel or oratory of some kind within his palace at Westminster, and this seems to have been rebuilt by King Stephen, who either re-dedicated it to his patron saint, or added his name to that of the original dedication. During the reign of Edward I., however, the building was injured by fire, and in the year 1292, King Edward I. commenced either the rebuilding or restoration. Now all the three modern works to which we have previously alluded are in thorough disagreement. Smith says "that Edward I. simply restored and decorated King Stephen's Chapel;" but Sir John Englefield and other writers, in the publications of the Society of Antiquaries, give it as their opinion that Edward I. entirely rebuilt the chapel, which was again injured by fire in 1298, and was not restored until the time of Edward III. Brayley, however, takes another view; he says that Edward I. rebuilt the church entirely, but that the work was completely destroyed by the fire in 1298, and that its rebuilding was commenced by Edward II., and in support of his view he quotes a roll which he says distinctly relates to the foundation of the chapel being laid in the year 1292, and a number of most interesting documents, which prove beyond doubt that Edward I. was carrying out important works in connexion with the chapel. But there is this very great difficulty about the matter; if Edward I. commenced building the chapel, as the document informs us, "in the month of April in the twentieth year of his reign (1292)," how is it that we find that on November 10 of the same year, the painters and decorators were called in?

Surely in the space of seven months the chapel could not have advanced far enough for its walls to be painted.

The roll to which Brayley refers is entitled "Michaelis de Cantuarria," and is in bundle 870 under the nineteenth year of the reign of Edward I., and is referred to as "Primus Rotulus de Operationibus primo factis pro Capella Beati Stephani in Palatio Westmonasterio," and also as "Rotulus de Misis et Expensis factis Circa Fundamentum Capelle Regis in suo Palatio apud Westmonasterium per Manum Magistri Michaelis de Cantuarria Cementarij. . . . Vicesimo Octavo de Mensis Aprilis anno Regni Regis Edwardi, filij Regis Heurici." There can be no doubt whatever, from the wording of this roll, that Edward I. commenced the entire rebuilding of the chapel in the nineteenth or twentieth year of his reign, that is 1292, and we can only suppose that the painters were employed upon some adjunct to the chapel—possibly the "Oratory of Our Lady of the Pew," which had been previously rebuilt. The series of accounts relating to the reign of Edward I. are given at considerable length by Smith, and they extend from the nineteenth to the twenty-second year of that King's reign. From them we learn that Master Michael, the *aparator* or foreman, was paid 3s. 6d. a week, that other masons were paid for five days, 2s. 1d. each; but that some, for five days, received only 1s. 8d. each. Jacob Lenesham, the chief smith, had 3s.; the carpenters seem to have received about 5½d. each. Of the painters employed, Master Walter, who seems to have been the principal of them, received 7s. a week, but John of Soningdon, Roger of Winchester, and Roger of Carlysle, received 2s. 6d. each, whereas Thomas, son of the master (*i.e.*, Master Walter); William of Ross, William of Oxford, Matthew of Worcester, Godfrey of Norfolk, received each 1s. 10½d. for five days. There were, however, two Italians, Andrea and Giletto, who received 8s. for six days, so it is evident that the foreigner did not undersell the Englishman in those times. A very interesting thing about this painting is that it was executed with oil, as we find over and over again charges for "one pottle of oil, 5d.," also varnish, "1 lb., 3½d.;" 8 lb. of white lead, 1s. 2d." Four hundred of gold

* Or Hill.

(evidently gold leaf) is charged 13s. 4d. Four hundred of silver, 2s.

Smith says that "the chapel, as thus rebuilt and decorated by Edward I., seems to have remained until the beginning of the reign of Edward III., who, with a view of rendering it more splendid, rather than because it required repair, pulled it down and erected it upon a much larger scale." Although he is borne out in this statement by Stowe and others, yet it does not appear to be correct. We know from Matthew of Westminster that in the year 1298 a great fire broke out in the smaller hall at the Palace of Westminster, which destroyed the palace and part of the Abhey, and, in the charter given by Edward III. for the foundation of a college of priests attached to St. Stephen's chapel, he says: "Capellam quandam spatio-sam, in pallatio nostro apud Westmonasterium situatam, in honorem beati Stephani prothomatrix, per progenitores nostros nobiliter inchoatam, nostris sumptibus, regis, fecimus consummari." ("Flores Historiarum Londini," 1570, p. 411.) From this it is quite evident that Edward I., who, was, of course, included in "progenitores nostros," did not complete the chapel, also, that Edward III. did not entirely rebuild it, but "caused it to be completed, at our expense." There is also another matter which must be taken into consideration, viz., that, from the rolls existing at the Record Office, we find work was being carried out at the chapel from the first to the seventh year of Edward II., and in the last year of that King's reign, charges are made for cutting timber in the forest of Tonbridge, "pro Capella Regis Westm." In the fourth year of Edward III., the works of the chapel were evidently resumed on a very large and important scale, as we see from the roll of Robert de Hill.

Now, we suggest that the whole of these difficulties can be explained by a reference to the chapel itself. Of course, it was to a great extent destroyed by the fire in 1834, but the crypt escaped, though in a very mutilated condition.* One thing, however, could be seen in connexion with it, and that was that the work was of two distinct dates. The great solid piers supporting the vaulting looked like Edward I.'s work (1292), but the vaulting which they support has lierne ribs, and the tracery of the windows ogee cusping. We are inclined to think that these latter features date from the reign of Edward II., and are the works referred to as being executed by that monarch. In the last year of Edward II.'s reign, as we have previously pointed out, timber was being cut for the chapel in the forest of Tonbridge, and if we turn to the roll of Robert de Hill, we shall find that this timber was used for the scaffolding for erecting the upper chapel.

But before considering this point, we must take notice of the first mention which we find in the rolls of Edward III.'s operations at St. Stephens. "Fourth year of the reign of Edward III. (1330), May 27. To Master Thomas, the mason, coming first to Westminster, and beginning there upon the New Chapel of St. Stephen, 'et intrasura super moldas operanti,' for his wages for six days, by order of the lord treasurer and council, 6s." Probably we may regard Master Thomas, or, as he is sometimes called, "Master Thomas of Canterbury," as the architect, and, throughout all the accounts in which his name is mentioned, we find that he received 1s. a day wages. "Intrasura super moldas operanti" is supposed to mean working upon the models in the Treasury. On June 5, 400 stones from Caen are bought at 4s. per 100, and 800 stones, called "quoins" or "coyns." July 15, "To Robert Leclerk and three scaffold-makers, for erecting a scaffold at the east end of the chapel," &c., for five days at 3½d. a day, 4s. 4½d. It is certainly strange to read that a scaffold-maker was paid more than a quarter the allowance of an architect! On the same day, we find the following entries:—"To six masons for five days, at 5½d. per day, 13s. 9d. To Walter

Penny, marble merchant, for six days, at 5½d. per day, 2s. 9d." On July 23, we find more scaffold makers employed and more marble masons, and very extensive scaffold works being erected at the east end of the chapel. From the fact that the workmen and the scaffolding make their appearance at the same time, it is quite evident that the upper chapel is in progress, and it should be noted that we find no charges here, as we do in the accounts of Edward I.'s time, for work on foundations. Marble masons being mentioned, proves also that the work was for the upper chapel, as no marble was used for the crypt.

The principal work for this year seems to have been on the east gable end, but, on April 27, 1331, we find twenty-three large Reigate stones for the "form pieces" for the windows, and, on June 15, 1331, "fifteen pieces of Reigate stone for 'mold pieces' for the upper windows," nineteen pieces of Reigate stone for the sides of the chapel; July 6, fourteen pieces of stone called "form pieces" for the windows; and, on July 20, "one hundredweight of lime for the great window of east gable," and so the accounts run on to 1341. From the fifth to the fourteenth year of Edward III., Walter de Weston was clerk of the works, and at the Record Office his account is still preserved. By the 17th of Edward III. the work seems to have progressed considerably, as we find charges for covering up the tabernacles with boards. By the 21st of Edward III., 1347, we find the carpenters were at work upon the ceiling, and the accounts of this are very interesting because they set at rest a question which has been very much disputed amongst antiquaries, some insisting that St. Stephen's had a stone vault. Mr. Lee, in an insinuating restoration of the chapel made about 70 years back, represents it with an open timber roof of impossible construction.† But let us see what the accounts tell us. On May 19, 1347, we find John Fulbourn, Thomas Sell, with eighteen other carpenters working on the "Vesura."‡ On October 16 there are sixteen carpenters working *super stapulationem vosura*. (Smith and Brayley both give this word as "stapulationem," which really has no meaning at all, but we believe the word to be a mistake for "scalpulationem," which would make the sentence read in English "working upon the carving of the vaulting.") On October 27 there are twenty-three carpenters working upon the *vosura*, and two carpenters apprentices, carving "hosses," also large sums of money expended upon "fish sounds for making glue" for the carpenters. Now, there can be no doubt from this that the roof was a wooden barrel-vault, but it appears to have had bosses and ribs, because in the 19th of Edward III. we find "29 courses for strengthening the arches and keystones of the *vensura* (vosura)." Although it was evidently a ribbed vault, it could not have possessed groins or cross vaults, as all the existing drawings show a cornice over the windows, surmounted by a pierced parapet which was unbroken from end to end, and there were neither vaulting shafts nor springers of any kind. In the twenty-fifth year of Edward III., 1351, we find William Padryngton at work upon the staves for the chapel. We read as follows:—"To William Padryngton for one large stone bought at Dunstable 10s. For two stones to make images of sergeants at arms, 10s. For two images made for the chapel by agreement . . . to receive by task work for each 4 marks 5s. 8d." "For making twenty angels to stand in the tabernacles, 6s. 8d. for each image." "For making a certain image called John le Wayte of stone found by himself, by taskwork, 1l. 6s. 8d." "For making three kings to stand in the tabernacles of the chapel, of the king's stone by task work 2l. 13s. 4d. for each image; 8l." The tabernacles mentioned in these accounts are the great niches between the windows, which had two rows of statues within them. The upper

tier consisting of small angels and the lower of large statues of kings. We also find that on November 14, 1351, a certain "Lodge" was new made for making the stalls for the chapel, and we find accounts for "two sawyers sawing timber for the stalls five days, 5d. per day each." To Richard Wilton "apparil" or foreman, working on the stall six days, for his weekly wages 3s. 6d." "Five carpenters at 6d. each per day." "1,000 great spiking" for "the planks of the stalls." There are a number of other accounts, such as sawing timber for the finials of stalls, &c.

And now comes a question which has puzzled all writers upon St. Stephen's Chapel, and it is this,—Where were the stalls placed? It is quite evident that they could not have stood against the walls of the chapel, because the great double basement table, surmounted by the beautiful wall arcading which is so magnificent a feature of the interior of this chapel, passed completely round the building, except where broken by the doorways. We think there can be little doubt that the stalls stood some 5ft. or 6ft. away from the walls, leaving a passage clear on either side, and that they were backed up by stone screens, as we see in the Cathedral of Alby, and many other churches in the south of France and in Spain.

We know also for certain that there was a rood-screen in the chapel, because it is mentioned in the will of Henry VI., who leaves instructions that the rood-screen and stalls of Eton Chapel should be made in the same manner and form as those in St. Stephen's Chapel (see letter by John Cranch in Smith's work).

Here is a curious entry from the roll of Walter de Weston: "Several pieces of Caen stone wrought for the columns and corall of the said chapel, which lie in the east end of the chapel." In Du Cange's Glossary, the word "Corallum" signifies the "inner part of anything which is enclosed within something else,—the intestines, for instance,—or a space enclosed within another." This seems to point to the fact that the Ritual choir of St. Stephen's was enclosed within screens, standing free of the walls all round, and several of the accounts go to strengthen this view. Thus: "To John Brothers for one shiplond of chalk for the repair of the wall between the stalls." "To Master Edmund Canon,—master stonemason, working on the stalls * * * 364 days, at 1s. 6d. per day, from the 5th day of June,—31st Edward III." Now, as Edmund Canon is mentioned as "master stonemason," there can be no doubt that his work was executed in that material, and we would call attention to the very high wages which he received, 1s. 6d. per day, half as much again as the architect, so that, undoubtedly these stone screens, which are sometimes referred to as "re-dosses," were of an extremely elaborate nature.† The only charge that we can find in the accounts which could refer to the rood-screen is as follows:—"26th Edward III., four pairs of capitals and hesses bought for the ambo of the chapel." The word "ambo" is certainly not used here to signify a pulpit. This rood-screen must have had two altars against it, because William Prestwick directs by his will that mass should be said for him "at one of the two altars in the nave of the chapel."

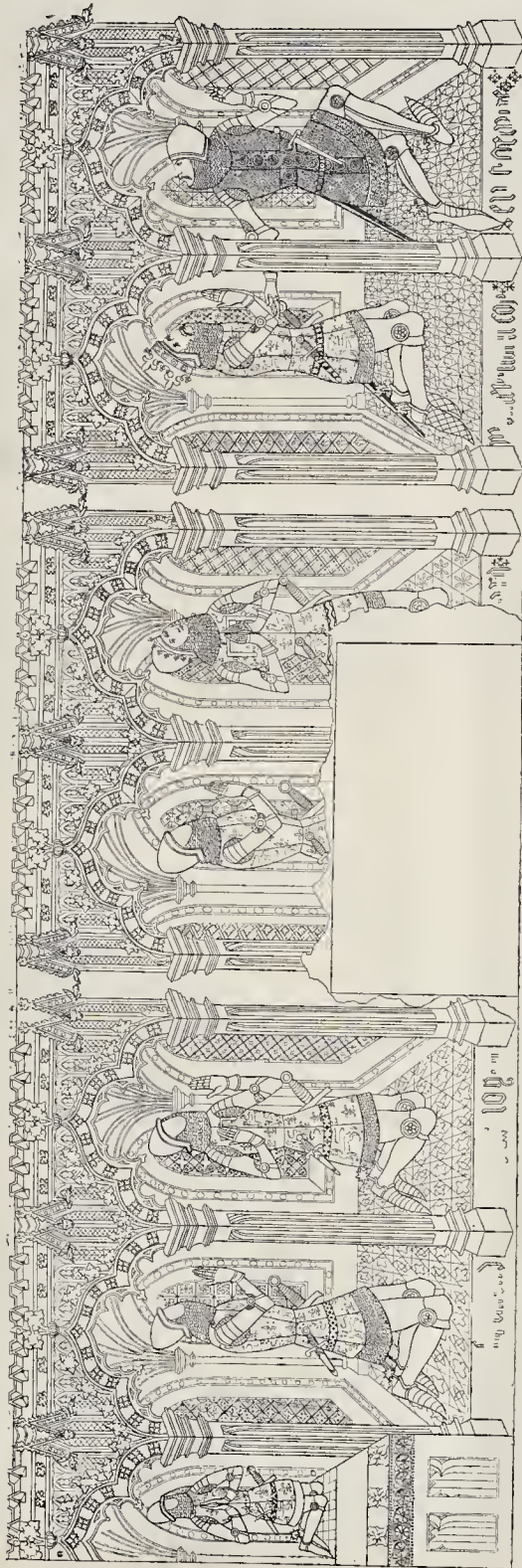
With regard to the suggested treatment of the choir at St. Stephen's, it should be pointed out that the chapel was very wide,—32 ft. from wall to wall,—and that the sub-structure of the crypt was sufficiently solid to support the superimposed weight of stalls, screens, &c. The responds in the eastern portions of the crypt had a most unusual amount of projection,—nearly 6 ft. from the wall; and there was no corresponding projection of any kind in the upper chapel. The vaulting is also very ponderous, as if constructed for the purpose of supporting a great weight; whereas, if the choir had not been arranged

* "Form pieces" we take to mean tracery, and "mold pieces," the arches and jambs of the windows.
† See his drawings in the Architectural Museum.
‡ This word is spelt in various ways,—"vosura," "vesura," "vossura," &c. It means vaulting.

* Probably long nails or pegs.

† Probably Edmund Canon also designed these screens, which would account for the high wages he received.

* This crypt has since been restored, and now serves as a chapel for the House of Commons.



[See next page.

Fig. 1.—Portraits of the Princes of the Family of Edward III. on East Wall of St. Stephen's Chapel, Westminster.

as suggested, there would have been absolutely nothing to support, except the floor of the chapel, which might, as is the case at Ely Chapel, Holborn, have been supported upon beams of timber. Another doubtful point is the tracery of the windows. Although this was in existence when Hollar made his views (which, by the way, are very inaccurate), yet, when Wren restored the building, as shown in the views given by Maitland, Malcolm, and others, every vestige of tracery had disappeared. With every respect for Sir Christopher Wren, it would be difficult to conceive anything much more hideous than the interior of St. Stephen's Chapel, as arranged by him for the use of the House of Commons. A flat plaster ceiling cut the building at the springing of the window arches. The windows themselves were hocked up, and square holes quite devoid of design, fitted with great sashes, were substituted. The great east window was also hocked up, and round-headed lights substituted. The western portion of the chapel was converted into a lobby, with rooms above it. Every portion of the ancient work was most carefully excluded from view by lath and plaster partitions, brick work, boarding, and panelling. In fact, it was not until the year 1790, when it became necessary to remove some of Wren's additions, that the elaborate and exquisite work concealed behind them was known to exist. This discovery led to the publication of Smith's work, and Carter's drawings. The whole arrangement of the walls and magnificent arcades of the chapel was brought to light, but Wren had so carefully destroyed every vestige of the window tracery, that not a particle of it was discovered either then or at a subsequent period, and all we can tell is that the side windows were divided by mullions into four lights, that these mullions were adorned with shafts, and that the lights were hocked about one-third of their height, the space so hocked being adorned by a series of wall-painting, remains of which are still preserved in the British Museum, and that the head of the great east window was trefoil in shape, though enclosed within a sharp-pointed arch internally.

It will be seen from this statement that the tracery of the windows shown in the drawing (see lithograph) is conjectural, and it is, perhaps, right to explain why it is treated in such a different manner to that shown by Mr. Billings in his drawings for Britton & Brayley's "Palace of Westminster" and Mr. Lee's restoration at the Architectural Museum. We know, fortunately, from the accounts contained in the roll of Robert de Hill, that these windows were commenced in 1331. Now Mr. Billings shows purely geometric tracery founded upon the east window at Merton Chapel; but the choir of Merton was certainly completed before the year 1277, whereas the windows at St. Stephen's were not commenced until the year 1331; so that in restoring these windows we should study contemporary work,—the Lady Chapel at Ely, for instance (1321 to 1349), the octagon and later portion of the choir of the same cathedral (1322 to 1373), or the additions made to the cloisters of Westminster Abbey in the time of Edward III.,—and we shall see, if we do so, that the tracery must have been curvilinear, and not geometrical; in addition to which, the beautiful little parapets and canopies which adorned the walls of the chapel were all curvilinear. Some fragments of these are preserved at the British Museum and at the Architectural Museum in Tufton-street. Sprandrels of the windows did, it is true, to a certain extent partake of a geometrical character. Probably, however, this was merely done to ensure a look of repose and quietness in this part of the building, which could not have been obtained if the space had been filled in with curvilinear traceries. The magnificent canopies between the windows, and the beautiful series of canopied niches forming the wall arcade, remind one strongly of similar features in the Lady Chapel at Ely. In 1351 the stained glass was commenced. The principal artists

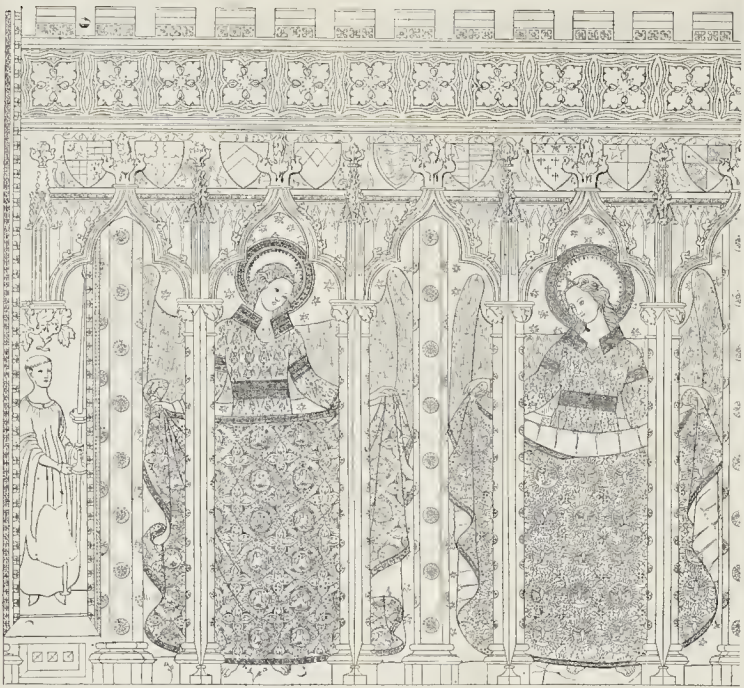


Fig. 2.—Decorations of Wall Arcade, St. Stephen's Chapel.

appear to have been Master John de Chester, whose wages were 7s. a week, and John Athelard, John Lincoln, Simon Lennie, John Lenton, and Goodman de Lenton, each of whom received 1s. a day. It is distinctly stated in the accounts that they were employed in "drawing images for the windows." The other workmen employed received from 7d. to 4d. a day. Some fragments of this glass were discovered in Smith's time, and are represented in his work.

The magnificent Chapel of St. Stephen at Westminster, notwithstanding its superb carving, marble shafts, and stained-glass windows, did not completely satisfy the religious sentiments and artistic aspirations of the age, for in addition to all these architectural embellishments, a complete scheme of decorative painting was carried out over the whole building. A good deal of the work consisted of ornamental borders, patterns, and rosettes raised in stucco, which are spoken of as "pryntes." Not only were these ornaments placed on the stonework, but even upon the marble shafts. They are of a similar nature to what the Italians call "gesso," but whether of the same material it is difficult to say, as this is not stated in any of the accounts. There can be no doubt whatever that the paintings executed for St. Stephen's Chapel were carried out in oil, as we find such entries as the following over and over again:—"For nineteen flagons of painters' oil, at 3s. 4d. per flagon, 3l. 3s. 4d." "For 19 lbs. of white-lead, at 4d. per lb., 6s. 4d." "For 62 lbs. of red-lead, at 5d. per lb., 1l. 5s. 10d." "For 6½ lbs. of white varnish, at 9d. per lb., 4s. 10½d." "For 18 lbs. of red varnish, 4d. per lb., 6s." Whether the oil and varnish were mixed with the colours, or used only in the priming and as a glaze over the painting, it is, of course, impossible to say, but a letter published by Smith from Mr. J. Haslam, chemist and apothecary to Bridewell and Bethlehem Hospitals, who analysed the colours used in the decorations at St. Stephen's Chapel, seems to show that the

colours were actually mixed with oil, because he says:—

"In order to examine these colours, I was obliged, after having carefully scraped them from the stone, to employ a quantity of impure ether to dissolve the varnish which had been laid over them, and also to separate the oil with which the colours had been prepared. By this method I was enabled to procure the colours in a state of purity after they had subsided to the bottom of the phial. The supernatant liquor, when decanted and mixed with water, became immediately turbid, and an oleaginous matter swam on the surface."

This is very interesting, because it shows that oil-painting was practised in England long before the days of Jan Van Eyck; in fact, if we take these entries as throwing light upon the former series, which date as far back as the reign of Edward I., it follows that the art was known in this country about a century and a half before Vasari says that Van Eyck "invented oil-painting."

The painters employed were evidently of two distinct classes, picture painters, or figure painters, and ordinary "house painters;" and the accounts show also that there were two distinct scales of charges for the colours used. The head or master painter was Master Hugh of St. Alhans, who was paid 1s. a day; he was, we are told, employed in "drawing out the images" (i.e., figures), painting various "images" and the "ordination" of the images, that is, their arrangement or design. We find John Cotton and William Maynard received also 1s. a day each, and worked upon the "images," and that John Elham, Gilbert Pockerich, and William Walsingham, were paid 10d. a day each, and are described as "painting the figures on the walls of the chapel." There was, however, one man, John Barnehy, who received 2s. a day, but he appears only to have worked at St. Stephen's for about six weeks. Possibly he painted the portraits of the King and Royal family in the reredos under the east window, of which we give illustrations (Fig. 1). We know that William Walsingham was at work upon the great angels painted in the wall arcade

(Fig. 2), and probably he, Elham, and Pockerich executed that work, and the figures of the knights on the responds below the statues of the kings; because although these are remarkably fine, yet from their being painted in a more conventional style than the pictures under the side windows, or those in the reredos of the east wall, it is probable that they were designed by Hugh of St. Alhans, and executed by those working under him, whereas the latter are, judging from the fragments remaining at the British Museum, of far too individual a character not to have each been the work of one artist; probably Hugh himself, Cotton, Maynard, and other eminent painters, whose names are now forgotten, executed them. There were numerous other painters employed at wages varying from 9d. to 5d. a day, who from the work which they are recorded as doing were evidently simply decorators and gilders, and certain men were paid 4½d. per day for "grinding and tempering the colours for the painters," fixing on the "pryntes," painting the "lysare" of the windows (probably the splays or jambs).

Just as there were two distinct scales of wages paid for the two classes of workmen, so there were two distinct scales of charges for the colours used. The

better colours were enormously expensive, and could only have been used in small quantities for the pictures. Even for the oils used we find this to have been the case. The following examples taken from a very long list will suffice:—

"To Master Hugh for four flagons of oil for painting the chapel at 1s. 11½d. per flagon, 7s. 6d." But elsewhere we read:—

"To the same for thirteen flagons of painters' oil at 3s. 4d. per flagon, £2. 3s. 4d."

Then we find white lead charged 2½d. per lb., and the same at 4½d. per lb., and in one place at 6d. per lb.

"Vermelon" (vermilion) is charged 1s. per lb., and again in other places 2s. per lb. The colours called cynopre and cynopre vary still more.

"Cynopre," or cynopre, is charged 8s. per lb., and elsewhere as high as 1l. 10s. per lb. The colour called "teynt" (probably crimson lake) is charged for at 4s. per lb., but elsewhere 3s. 4d.; red-lead, 5d. to 1s. 4d. per lb.; and "oker" from 6d. for 4 lb. to as much as 4d. per lb. Verdgris, from 10d. to 1s. 2d. per lb. Even the gold leaf varies considerably, as we find it charged for at 4s., 4s. 6d., and 5s. per hundred, and the cheaper kind is spoken of as being used for gilding the tabernacles. Half a pound of "synopre" is in one case charged 1l. 10s. 6d.; that is to say that this colour cost 3l. 1s. per lb. in those days. Cynopre is charged 20s. per lb. Now, if we multiply these by forty we shall arrive at something like the present value of these colours. We shall find that "synopre" (we do not know if this is the same colour as cynopre) would cost the enormous sum of 120l. per lb.,—i.e., about three times its weight in gold!

As previously remarked, some portions of the paintings executed at St. Stephen's Chapel still exist in the British Museum. They were presented by the "Royal Society of Antiquaries," who at the commencement of the century preserved these valuable frag-

* Probably "synopre," "cynopre," "cynopre," "cynopre," are all the same colour.

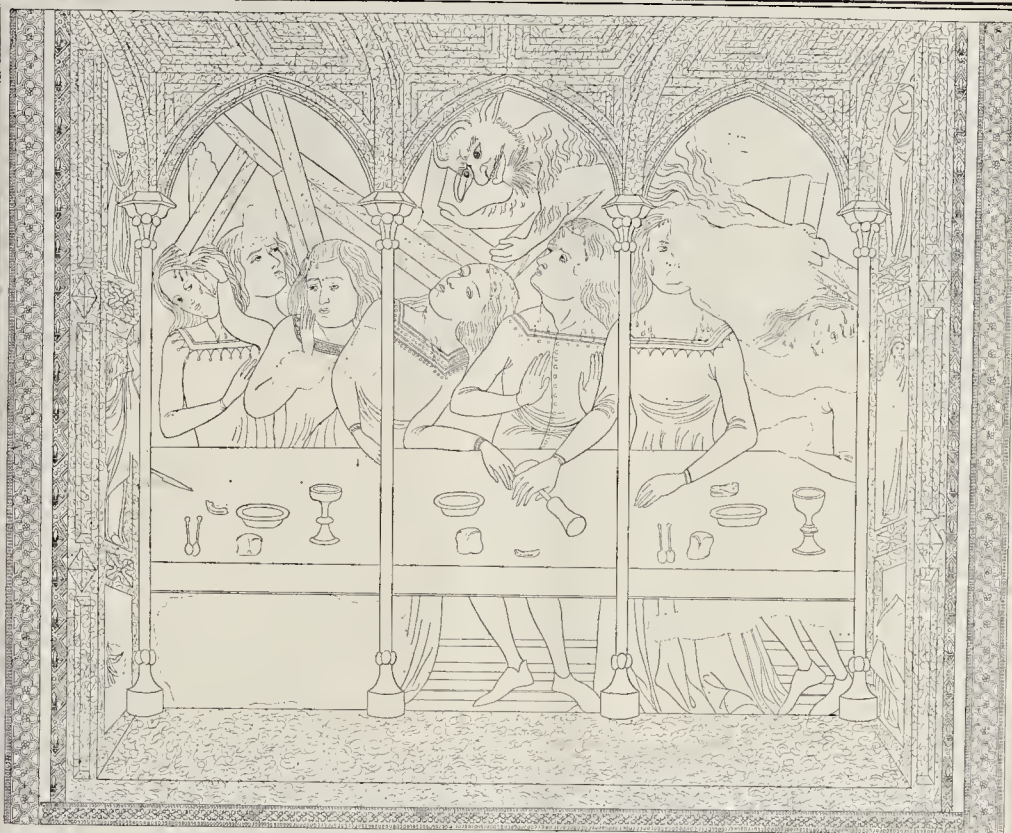


Fig. 3.—The Destruction of Job's Children: one of the Paintings preserved at the British Museum.

ments from destruction. The paintings, which could not be removed when St. Stephen's Chapel, were enlarged for the accommodation of the Irish members of Parliament, and were traced and copied for the Society by Mr. R. Smirke. The tracings are still preserved in the library of the Society, together with a water-colour drawing of the paintings upon the east wall of the chapel, with the portraits of the family of Edward III. The tracings are unfortunately rather roughly executed. No doubt the fact that much of the ornament was raised in "gesso" presented a difficulty to their being traced. These works were engraved by Basire, and published by the Society in 1807. Our illustrations of these decorations are reproduced from Basire's engravings. It should at once be pointed out that the engravings in no way do justice to the original paintings, because the artists of the fourteenth century at St. Stephen's Chapel drew with singular delicacy and beauty, although their work was to our ideas somewhat archaic, whereas the outlines here given immensely exaggerate the archaic character, and lose a great deal of the delicacy. This is especially noticeable in the drawings of the hands and feet.

The paintings now preserved in the British Museum all consist of subjects taken from the history of Job, Tobit, and Tobias. They appear to be painted direct upon the stone, with nothing intervening except a priming of red-lead, to which allusion is several times made in the accounts. How this red-lead was prepared it is impossible to say, but it has preserved its colour for over five hundred years.

These pictures are about 2 ft. long and 18 in. wide, and the following are the subjects:—

1. Job addressing his children.

2. Job's children obtain permission to attend the feast. These form a pair.

3. Destruction of Job's children (Fig. 3).

4. Messengers of misfortune come to Job.

5. Job and Zophar.

6. Job's Comforters.

7. The Nuptial Feast of Tobias.

8. The Angel Raphael leaving Tobias.

9. Tobit and the Sparrow.

There are several peculiarities which should be pointed out. The first is this, that although these subjects are all treated in perspective, and the backgrounds are very naturalistic, yet sky painting is everywhere avoided. The spaces which would be occupied by sky are filled in with very rich stucco patterns, raised and gilt. No doubt the brilliant effect produced by this treatment would, in a decorative picture, give the general impression of sky more readily than the painted clouds by which a modern artist would attempt to convey the idea, and there is a very singular fact about this,—indeed, a kind of optical illusion, for while in reality this stamped and gilded background projects far in front of the figures, yet, when looked at at a short distance, the figures appear to stand out a long way in front of it. The treatment of the figures is more after the Early Italian than the German or Flemish method. Some of the heads, especially the female ones, in "The destruction of Job's children" are very beautiful, and show that painting in England must have been in as advanced a condition as in any other country of Europe. Even if we had not the evidence to which we have previously alluded, these pictures themselves bear strong evidence of their nationality. Especially is this the case with the architectural backgrounds and the framework with which they are surrounded. The latter is

very singularly treated in "The destruction of Job's children," as it consists of a bordering of square panels filled-in with little statuettes, and an arcade of three arches running across the picture; the whole carefully painted to imitate Purbeck marble. In "Tobit and the Angel" the background looks as if it had been painted from some existing building, which has a sharp pointed Early-Decorated doorway, with an arcade over it purely English in style; but in two of the pictures, "Job and Zophar" and "Job and his Comforters," a curious imitation of Eastern architecture occurs. We find minarets and highly stilted semi-circular arches, but combined with very Norman-looking battlements and panelings. The background of "Job and his Messengers" contains a great deal of architectural painting, representing a kind of cloister, the arcades of which are alternately green and pink. Strangely enough the effect of this is remarkably pretty.

The colours used in these pictures are bright and pure, and although oil has evidently been used, we are inclined to think that the ultramarine blue, and some of the lighter tints, are distemper, as they do not possess the glossy surface which is noticeable in the other colours. In the same case in the British Museum, which contains these fragments of wall pictures, are to be seen remains of the inscriptions which were beneath them, and a large piece of the beautiful parapet which surmounted the wall-arcade. The vermilion used in the decoration of this is singularly brilliant, showing that the Medieval decorators and painters were never afraid of the use of red in a pure condition; they knew that if vermilion were used pure and unmixed it would always keep its place, but that any attempt to subdue it by the admixture of other colours had the reverse of

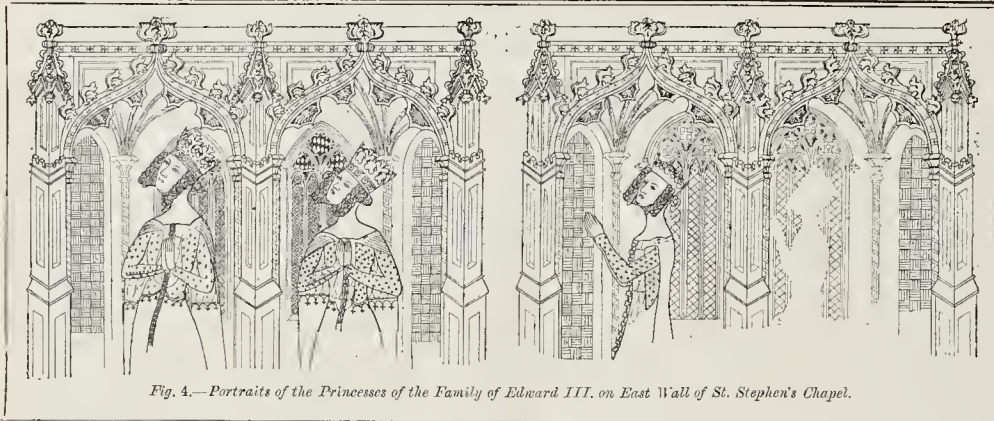


Fig. 4.—Portraits of the Princesses of the Family of Edward III. on East Wall of St. Stephen's Chapel.

a quieting effect. With the greens, however, they were very cautious, using scarcely anything except a very subdued tint resembling sap green, with the exception that it is not dirty like the modern colour which bears that name. Whether this green is the "synopre" for which such vast sums were charged, we cannot say, but it is a very beautiful colour, and is apparently used pure.

We cannot help thinking that we detect the same hand in some of these paintings which executed the beautiful work upon the lower part of the screen at Ranworth.

Unfortunately, we have not been able to discover any fragments of the work which adorned the east wall of the chapel. This is very much to be regretted, as the great picture of the visit of the Magi in the upper portion of the reredos, and the portraits of King Edward III. and his family on the lower portion, must have been works of great interest. Possibly these may exist in some private collection, and also other fragments of this once magnificent chapel.

Of course, the effect of the interior of St. Stephen's must have been very sumptuous, but its artists were too wise to overlook the fact that repose is a necessary element of grandeur, and the way in which they quieted the combination of so much colour and gilding is most instructive and offers an invaluable hint. Under all the cornices, round the windows, between the canopies in various other situations were strictly architectural patterns, consisting of quatrefoils, trefoil-headed panels, &c., painted perfectly flat in pure black and white. Black was also largely introduced into other portions of the decoration,—notably the backgrounds to the great angels and the armour of the knights. Probably the colour charged for under the title "Cole" was black; it was liquid, as it is described as being in flagons, and immense quantities were used. Probably also that black was introduced into the stained glass, because we find "Gaet (jet) bought for painting of the glass." It should be noted that the black and white were positive black and pure white, not stone colour and grey. In fact, it seems that the idea was to get the white, black, and red, as positive and pure as possible, but to temper and subdue the green and blue. Secondary and tertiary colours were used very sparingly, and seem in every case to have been isolated from their surroundings by gold; silver leaf was also used in small quantities, and there is a curious entry for silver leaf used for "painting a window to counterfeit glass!" This, perhaps, refers to one of the little windows introduced into the background of the picture of the Royal Family in the east wall (fig. 4). A very distinguishing feature is the fact that the gold seems never to have been applied to flat surfaces but always upon a stamped or raised ground; this was evidently done to avoid the glare of a gold background when applied flatly. We find no accounts for

the painting of the vaulting ("vossura"). Could it have been left undecorated? The pavement was of tile,—as we read,—"To William of Kent, for two thousand tiles for the pavement of the King's Chapel, £1," &c.

As we have previously pointed out, the accounts referred to are fragmentary, and do not describe all the beautiful features of this sumptuous and magnificent chapel, but they, at any rate, give us a considerable insight into the way in which a Royal Chapel was built and decorated in the Middle Ages.

NOTES.

THE case of *Bottens v. The Mayor and Corporation of York*, heard in the Court of Appeal last week, is no doubt one containing a serious warning for contractors. The plaintiff had contracted to make a sewer of several miles run, and after an apparently superficial examination of the ground, had sent in a tender which turned out to be the lowest, and which, in fact, was so unexpectedly low that his attention was called to it and he was given the opportunity of reconsidering his estimate, but on doing so adhered to it. No excavations or trial-holes had been made from which the nature of the soil could be ascertained, and when the work was commenced the soil was found to be of such a muddy and porous nature that not only was extensive timbering necessary, but a great deal of the work was ordered by the engineer (who was quite within his rights on this point) to be re-constructed, owing to the manner in which the brickwork had been crushed by the pressure of the soil. The contractor found the work would be ruinous to him, and claimed that the re-construction ought to be counted as new work. Mr. Justice Mathew decided against him with reluctance (though there could hardly be any doubt as to legal obligation of the contractor), and on appeal there was the same result: judgment for the defendants, accompanied by judicial expression of sympathy for the plaintiff. The practical lessons from this important and unfortunate case are, that contractors should take every pains to ascertain the nature of the ground before undertaking such a contract, and that it is desirable, in fairness to both parties, that some clause should be inserted providing for special modification of the conditions on the judgment of the engineer, on the discovery of any exceptional difficulties which could not be ascertained beforehand. But there is perhaps a moral consideration suggested also. The defendants in this case claimed only their legal rights; but what about their moral duties? The additional cost of the works was not the fault of the contractor; the condition of the ground being such as it proved to be, the cost in any case must have been far greater than the contractor's esti-

mate; and we must say that the spectacle of employers availing themselves of the want of caution of a contractor to compel him to execute work for them for half the sum which it must in any case have cost is not an edifying one, and we do not think the Corporation of York have any reason to be very proud of their position.

THE London County Council showed last week that curious want of business feeling which is one of their characteristics. In the provincial Town Councils the most Radical members nearly always exhibit a business instinct, but over and over again the London County Council have shown that they do not possess it. The Committee concerned with the administration of the Fire Brigade brought forward a motion that legislative powers should be asked for to enable sites for fire-engine stations to be obtained by compulsion. A majority of the members present, however (as we reported), carried an amendment to the effect that power should be obtained to take land compulsorily for any public purpose. The first proposal was reasonable and business-like; the latter, unreasonable and unbusiness-like. There was a clear and definite object for the application of compulsory powers of purchase in the first proposal; in the second, the object was essentially vague. The practical result will be that, whereas Parliament would almost certainly have granted the Council power to take land for the purpose of fire-engine stations, it will assuredly refuse to hand them a blank cheque, such as some of the Council desire. Consequently, compulsory powers for a useful and defined purpose will not be obtained, simply through the want of this business instinct to which we have referred.

LARCHITECTURE for July 16 gives a general view of the Roman ruins discovered at Timgad, in Algeria, the ancient Thamugas or Thmugadi. The view is a very striking one, and in the distance is seen the triumphal arch of which we published, in the *Builder* for October 4, 1890, a view and a restoration from the pencil of Mr. Alexander Graham, F.S.A. Mr. Graham accompanied those illustrations by some interesting notes as to the remains, and we may now refer our readers to the article entitled "Une Pompéi Algérienne" in the current number of *L'Architecture*, already mentioned, for an *étude* on the ruins communicated by M. Albert Ballu, chief architect in charge of the *monuments historiques* of Algeria, to the archaeological commission of the Société Centrale des Architectes Français.

THE Aachen branch of the Society of German Engineers some time ago appointed a committee to consider the subject of steel in reference to recently-developed processes, and its extended adoption for

purposes of construction. The report of the committee has recently been issued. The first point considered was whether soft or hard steel should be preferred, under general conditions, for building purposes. The conclusion arrived at was that, generally speaking, the softer steel is preferable. For ordinary industrial purposes the tensile strength should be between 23.45 and 28.60 tons per square inch, the minimum extension being 20 per cent. in 8-in. specimens. For bridge material the tensile strength should be between 23.45 and 27.30 tons per square inch. The report considers that it is not desirable to specify any chemical analysis, as the physical properties afford a sufficient index to the composition of the metal, and the result depends not only upon the quantitative identification of the component substances, but also upon their mechanical combination. It is, however, considered advisable to specify not only the class of material, but also the precise method and conditions of its production; but the committee are of opinion that the specification must be limited to such general normal conditions for the identification of quality as can indubitably be conformed to, and that any minute limitations are technically impracticable and without result, and, further, that they are commercially injurious. With regard to manipulation, the report chiefly notes that it is undesirable to work steel at a blue heat. Finally, the committee are of opinion that the working load might safely be increased to 6.35 tons per square inch for live loads, and 7.62 tons per square inch for dead loads. It will be gathered from the above that the German committee has not discovered any very new or startling points; but the conclusions are worthy of attention as being the expression of a competent body of engineers, belonging to a country where the use of steel for structural purposes has received intelligent appreciation, if not equally wide adoption. No doubt the committee are right in eliminating chemical analysis, which has done more to lead users astray than anything else. A very bad and a very good steel may show an almost identical analysis. Chemical investigation is for steel makers, not steel users; and even by the former it must be applied with great discrimination, and in conjunction with physical tests.

ON the 9th inst. we announced that the ruins of the Palaces at St. Cloud are about to be removed. The château was burnt down on October 13, 1870, and many of the houses around met with the same fate after the battle of Buzoval. The château which Pierre de Gondi, Archbishop of Paris, built here in the sixteenth century was acquired in 1658 by Louis XIV.'s brother, Philippe d'Orléans, who caused it to be rebuilt, employing as his architects Jules Hardouin Mansart, nephew of F. Mansart, Girard, and A. Le Pautre. Le Notre laid out the park, famous for its fountains and autumn fair. St. Cloud was a favourite residence of Marie Antoinette and of the Buonapartes in the first and second Empires. In the Maison de Gondi, the Dominican friar, Jacques Clement, assassinated Henri III., whose army lay on these western heights above the Seine, ready to advance upon Paris. The Council of Five Hundred used to assemble in the Orangery, until driven out by Napoleon. Originally known as Nogent, St. Cloud took its name from a monastery founded there in 538, by Hlodouald,—a son of Hlodimir, the Merovingian King of Orleans,—who made it his retreat after his brothers had been murdered. Le Mans, to which we referred at the same time, is also associated with the history of the Merovingian dynasty, our own Plantagenets, and the late war; for here, on January 12, 1871, the Germans gained the day in their final field engagement with the French. Marceau defeated the Vendéan army, under Larochejacquelin, at Le Mans, their last stronghold, in 1793, when a terrible carnage ensued. Besides the "House of the White Queen," we may men-

tion that of Scarron, near to the cathedral of St. Julien. In that cathedral, founded, it is said, by the saint in the third century, and celebrated for its beautiful thirteenth-century choir, were set up monuments to Richard I.'s Queen, brought from Epan Abbey; to Charles of Anjou, 1474; and to Langey du Bellay, temp. Henri II. Many of its features are illustrated in Viollet le Duc's work; the aisle walls are supposed to be of the eighth, or ninth, century. At Le Mans was born Henry II., son of the Empress Mathilda, by her marriage to Geoffroi d'Anjou, who chose for cognisance of his house a sprig of the broom growing plentifully in his native province of Anjou and Maine.

A PAPER by Mr. W. L. Saunders has been recently contributed to the American Society of Civil Engineers, in which some interesting details are given of the Knox system of drilling for rock blasting. The aim of this plan is to release the stone from its bed by directing the force of a blast to cleave the rock in a prescribed line without injury; or to split large blocks into smaller sizes without waste. The principle followed is, that if a hand-drilled hole be made approximately triangular, this line of rupture will follow the direction of the corners. In experiments previously made in sandstone, a blasting canister of diskoid form was tamped in a large circular hole, with its edges in the vertical plane, and in this prescribed line of fracture. In this way good results were obtained, though at a loss of material, owing to the large hole which was necessary to take the diskoid canister, but straight and true breaks were secured which followed the line of the disk edges. It was also known that square prismatic canisters gave two planes of fracture at right-angles to each other. For blasting granite the "lewising" system is followed. This consists of drilling two, three, or four holes in the line of desired fracture and breaking down the material between them. In the Knox system an ordinary round hole is drilled and then worked on two opposite sides, so as to give a cross section, which might be described as a square with each of two opposite corners filled in by a circular sweep, or as a circle with two angles added outside the periphery. The angles point to the required plane of cleavage, they supplying weak points from whence the crack starts. Into this crack the powder gases escape, to act like a wedge in continuing the fracture in a straight line to the extent of the force available. By this system very little material is wasted, and in no case in any rock should the holes be drilled above 1½ in. diameter. Hard rocks require less powder than soft, and soft rock requires holes at every 4 ft. and 5 ft., the charges being fired simultaneously by electricity. The tamping by the Knox process should not be directly on the powder, but an air space, as long as possible, consistent with sufficient tamping not to blow out, should intervene.

IT is high time that some steps were taken by the First Commissioner of Works to improve the open desert to the west of the Law Courts. The slope immediately in front of the new Bankruptcy Court is now green and pleasant to the eye, but the space to the south of the main walk is merely bare ground. It is clear that this portion should be laid out with walks and small open spaces, which should be supplied with seats. Some of these spaces should be grass-plots, others should be asphalt or gravel; on these latter places the children could play. The grass to which we have alluded above is only kept green because no one is allowed upon it. But a walk should be made completely round it, some trees planted, and seats placed at various distances, as in the gardens on the Embankment. This open space, even in its present state, is a great boon to the district in which it lies, but it might easily be made not only more pleasant for those who frequent it, but more worthy in appearance of the metropolis.

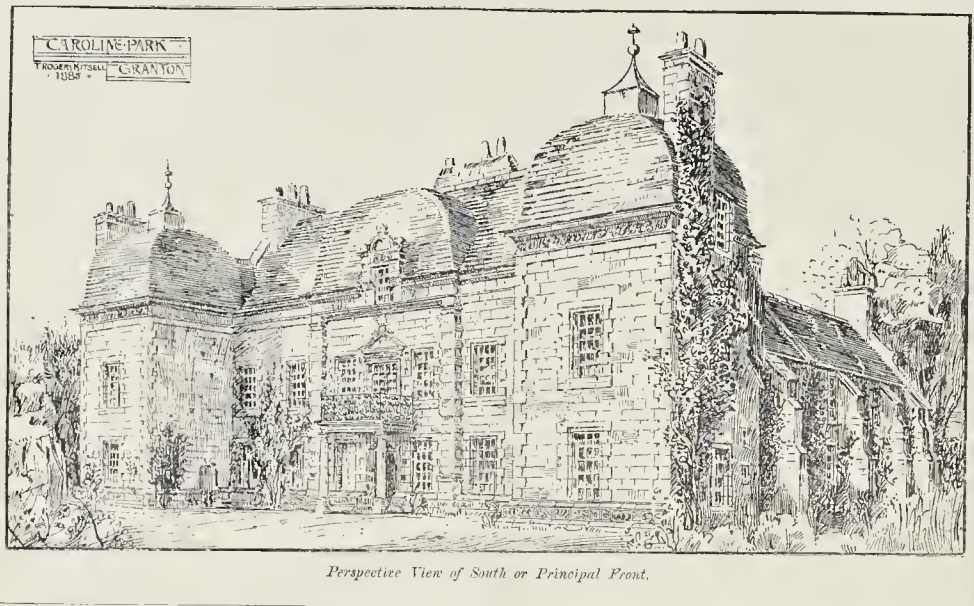
THE, at one time, all but insuperable difficulty of getting a foundation in quicksand has been disappearing for some time. The freezing process was one solution of the problem, but it was a tedious and expensive one. An American engineer, Mr. R. L. Harris, has gone on another principle, a description of which is given in a recent number of the New York *Engineering News*. Two pipes, some little distance apart, and both open at the bottom, are forced down into the quicksand, and water is then pumped down the one at pressure, upon which it will follow the line of least resistance and rise up the other. In this way a channel is established, and the sand will be washed away between the two pipes, leaving a cavity. In this way a series of cavities can be formed, and when this has been done, the outlet pipes are closed, and a fluid grouting of cement is pumped down. This permeates the adjoining material, forming a compact mass which hardens into a block of concrete. By withdrawing the pipes the concrete is built up to the surface, and a good foundation may be thus obtained. Details are given of an experimental application of the process to the construction of a sewer in a very treacherous quicksand in Providence, in the State of Rhode Island. The trench for the sewer was about 12 ft. to 16 ft. wide, and from 20 ft. to 30 ft. deep. On the line of the work four 2-in. pipes were driven down to a level of 1 ft. above the grade of the sewers. These pipes were 4 ft. apart, and, by means of a current of water through them, cavities were quickly swept out round their lower ends. When this had been done, a smaller pipe, fitted with a valve at its end, was slipped down each of the 2-in. pipes. When this pipe projected below its main pipe, there was a free passage for fluid either up or down, but when it was drawn up a little, no fluid would flow in an upward direction. The cementing fluid formed a solid mass with the sand, and, the earth being removed, a stone-like slab, about 6 in. thick, was found, connecting the points where the cement had been injected. Beneath this, and parallel to it, were thin sheets of cemented material. The principle is not altogether new to us, as Mr. J. H. Greathead has already followed much the same lines in the application of his method of construction of deep tunnel railways in going through water-bearing strata, using both the hydraulic means of excavation and the grouting to obtain a water-excluding crust.

THE members of the London County Council appear to be under the impression, from what was stated during the debate on Tuesday, that the new Parliament will regard such proposals as that known as the "betterment" principle more favourably than the Parliament which has lately been dissolved. But this belief seems to want foundation. No doubt a larger number of members are pledged to what is known as "the London programme," but we do not anticipate that any startling changes in regard to compensation and other matters of a similar character are likely to take place next session.

THE versatility of some of our own "advertising architects" sinks into insignificance before that of their brethren of North Queensland, Australia, if we may judge from an advertisement, cut from a local paper, which has been sent to us. It reads,—

— & Co.,
ARCHITECTS, AUCTIONEERS,
LAND, ESTATE, FINANCIAL,
INSURANCE, AND
GENERAL AGENTS.
ACCOUNTANTS & VALUERS IN
INSOLVENCY.
HORSE AND CATTLE SALESMEN,
HOTEL BROKERS,
Agents for
The — Agency Co."

Our readers (adds our correspondent) will no doubt be surprised at the high position which architecture has attained in the Colony.



Perspective View of South or Principal Front.

"CAROLINE PARK," GRANTON.

PICTURESQUELY situated about three miles north-west of Edinburgh, and on the shores of the river Forth, this interesting old house stands so secluded that the ordinary passer-by knows not of its existence, and even the architect would remain ignorant but for the fine entrance-gate pillars to the grounds, close on the road-side. It was built at the close of the seventeenth century by Sir George Mackenzie, Lord Tarbat, Prime Minister in Scotland under James VII., and who was, in 1703, created Earl of Cromarty by Queen Anne. His name, and that of his wife, are carved along the friezes of the pavilions of the later south front. The following translation of the inscription in the

panel over the north front gives shortly the Viscount's reason for building his house. It reads:—

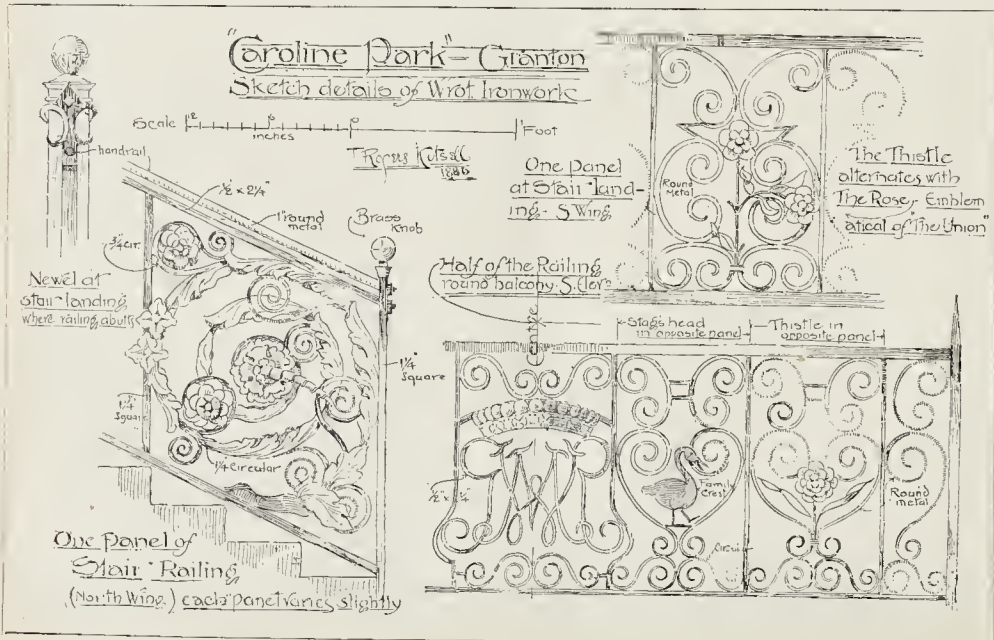
"Riches accumulated are valueless, but spent are useful. With lands come cares. For our own and our friends' comfort, George and Anna, Viscount and Viscountess of Tarbat, have caused this cottage to be built in the year of the Christian era, 1655. The guest is our care, for the house of entertainment is now ours, then another's, and afterwards I neither know nor care whose, for there is no certain dwelling-place. Therefore let us live well while we may."

Originally the principal entrance was the north one, but in 1696 the south front was remodelled, and is built in ashlar, the original doorway and some of the window lintels peeping out from under the new stone casing. This

alteration is interesting in showing the advance towards the more Classic style.

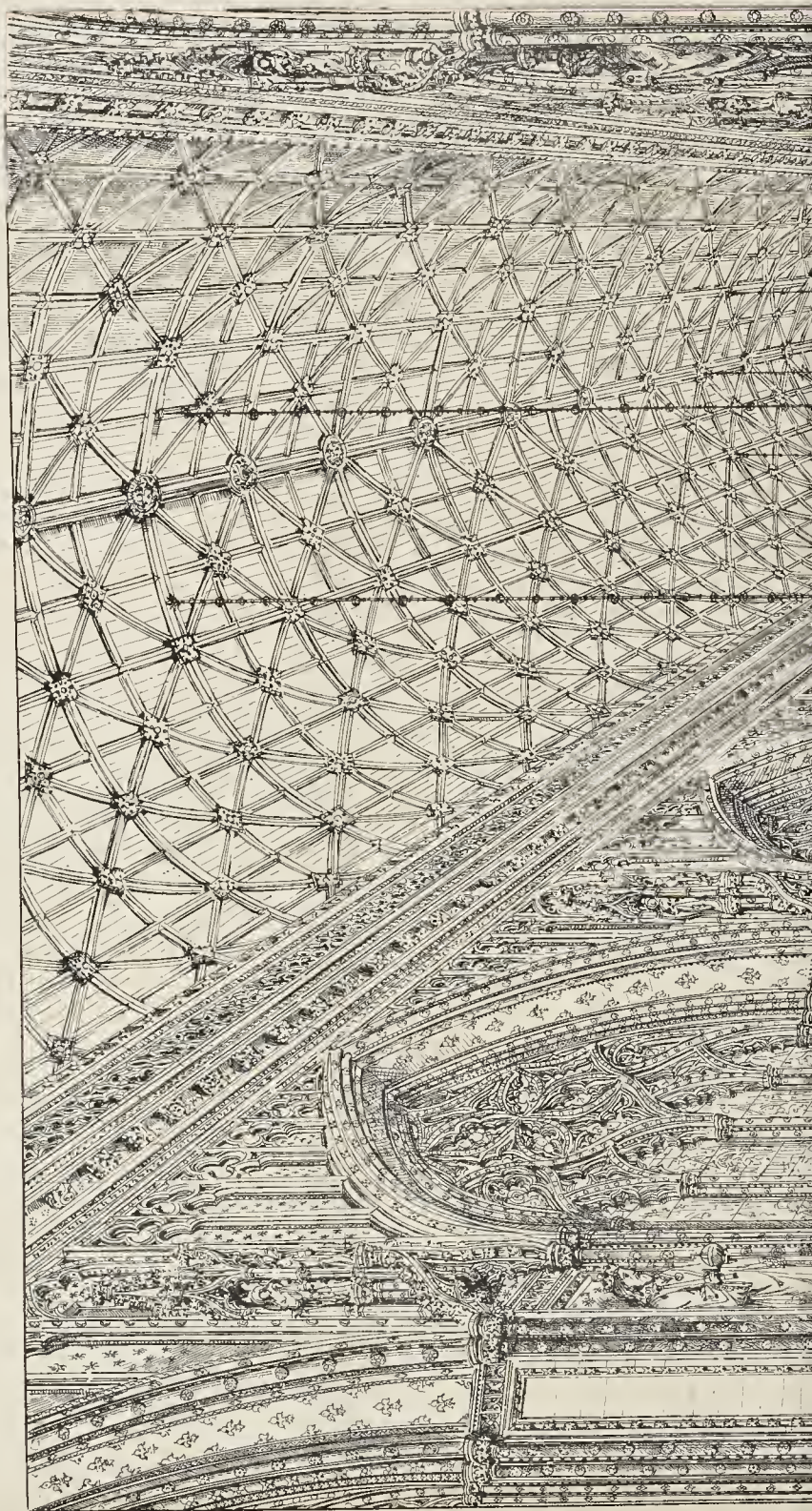
The house is full of good detail in wrought-ironwork, wood-pannelled walls, and fine plaster ceilings with centre subject paintings, signed "N. Hevde, Inventor" (an assistant to Antonio Verrio, an Italian painter invited to England by Charles II. to execute work at Windsor, Hampton Court, &c.). Several of the wood-panels over the fireplaces are also painted.

In 1739 Royston was purchased by the Duke of Argyll and Greenwich, from whom it passed in 1793 to Henry, Duke of Buccleuch, and is still held by the present Duke. This fine old house is now chiefly used as the offices of the well-known firm of A. B. Fleming & Co., who know how to care for it, and are always most





THE BUILDER, JULY 23, 1862.



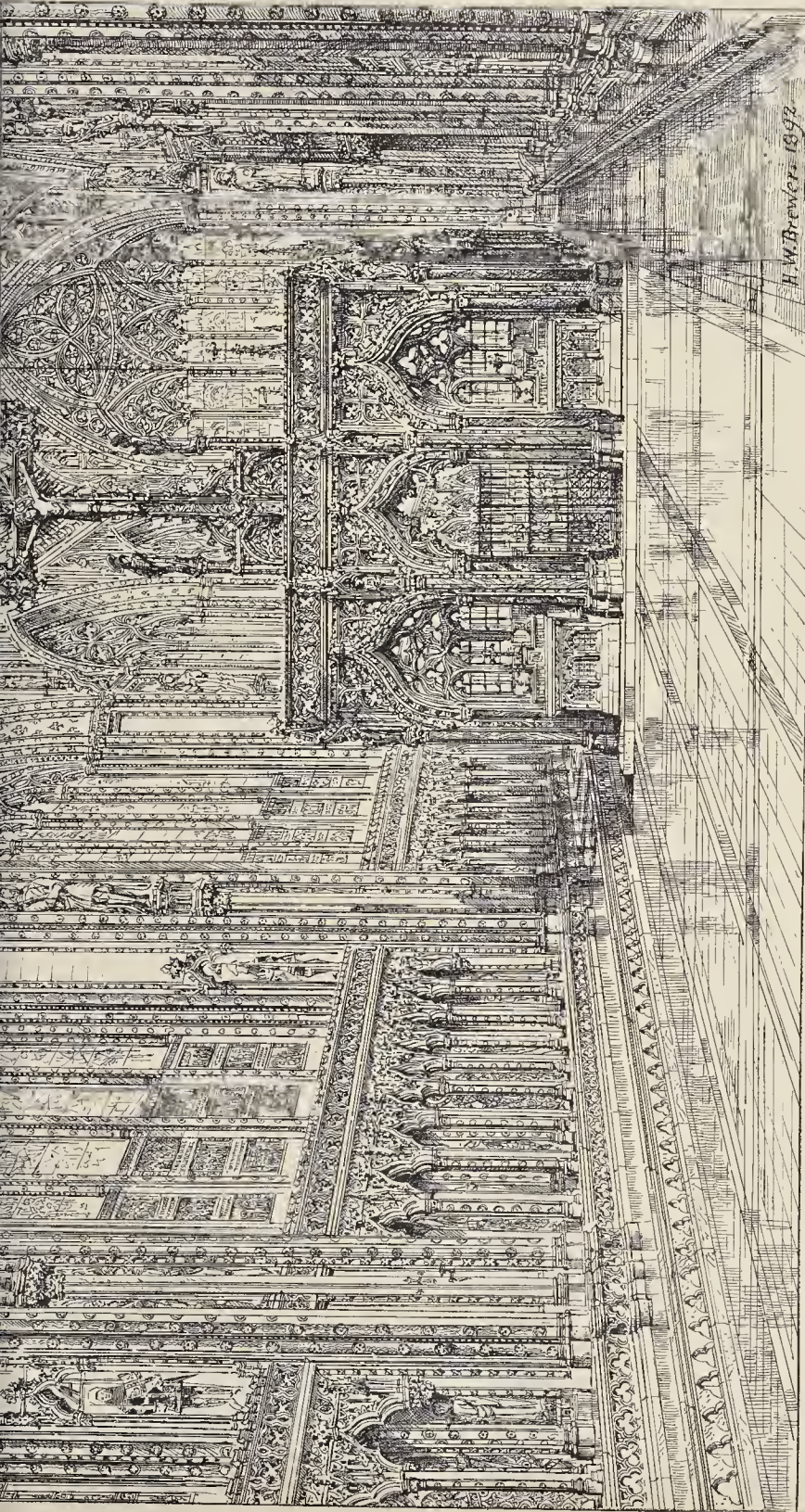


PHOTO (LITHO) SURPOSED & CO. 483, EAST WINDING STREET, LONDON, E.C.

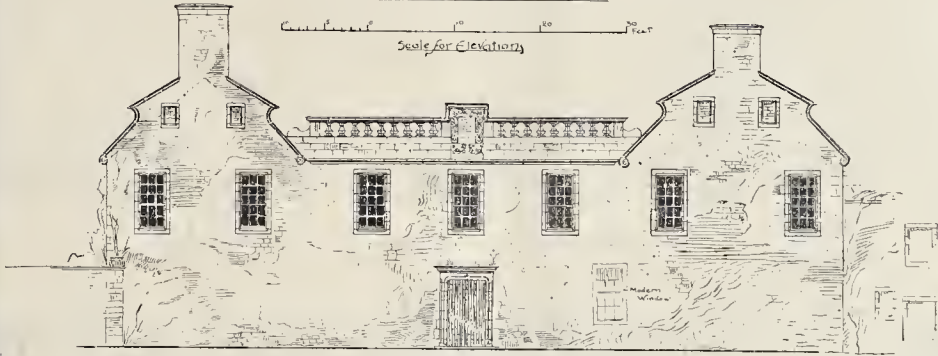
H. W. Brewer 1892

INTERIOR OF ST STEPHEN'S CHAPEL, WESTMINSTER.—RESTORED, FROM ANCIENT AUTHORITIES, BY MR. H. W. BREWER
(For description, see article on "THE BUILDING AND DECORATION OF A ROYAL CHAPEL.")

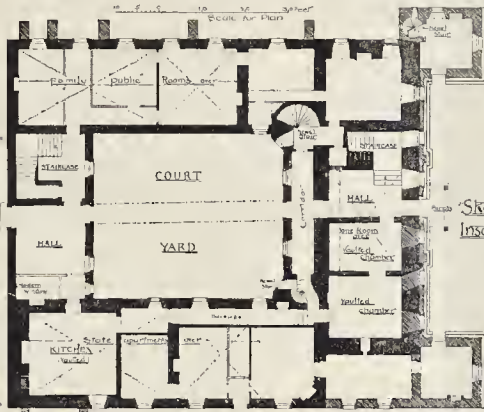
"CAROLINE PARK" FORMERLY ROYSTON HOUSE

GRANTON - Edinburgh

Scale for Elevations
0 10 20 Feet



THE NORTH ELEVATION



GROUND PLAN



Sketch of the
Inscription panel
(north front)



THE SOUTH ELEVATION

T. Rogers Kitself
mbr of Inst. 1885 6

willing to "clear the way" for the student of architecture who applies to them for permission to make free of their premises to sketch or measure.
T. ROGERS KITSELL.

ABERDEEN.—Lord Provost Stewart presided at a meeting of the Aberdeen Town Council on the 15th inst., when Mr. William Dyack, the present assistant, was appointed Burgh Surveyor, in room of Mr. W. Boulton, resigned, at a salary of 400*l.*, rising annually by 50*l.* to 600*l.*

THE ARCHITECTURAL ASSOCIATION.

WE are informed that a special general meeting of this Association will be held at 9, Condit-street, W., this Friday evening, July 22, at 7.30, to consider the resolutions printed in the following requisition:—

"To the Hon. Secs., Architectural Association.

Under the terms of By-law 43 we hereby require you to call a Special General Meeting of Members to consider the following resolutions:—

1. 'That the Committee having declared that one of

the names placed on the voting lists recently issued was improperly so placed,—the gentleman having resigned his membership,—the Committee alone are responsible for the error, as no public notice whatever is taken of resignations during the session, and therefore the general body of Members does not know who has resigned.'

2. 'That the number of votes given to this gentleman (now declared to be lost) would have been distributed among the other candidates, and that, therefore, the declared result of the voting is most unsatisfactory and misleading, if not actually invalid.'

3. 'That this meeting, therefore, directs the secretaries to issue proper and correct voting papers, to

secure their proper counting, and to have the result duly declared as the election of Committee and officers for session 1892-3."

The requisition is signed by Messrs. C. H. Brodie, Walter Dewes, A. F. Cutler, Chas. H. Freeman, Percy E. Newton, Sydney Tagwell, Edwd. Greenop, Percy D. Smith, Thos. Edward Pryce, John Todd, J. Stranson, G. A. Lansdown, Sydney B. Beale, Walter Millard, and J. W. Stonhold.

We have received a letter from a well-known member of the Association on this subject, supporting the views of the requisitionists, but we refrain from publishing it, as it contributes no new matter to the controversy, and, from its tone, is only likely to add fuel to the flames. We trust that moderate counsels may prevail on both the official and the non-official side, so that the Association may be delivered from internal strife at so important an epoch in its history.

Illustrations.

RESTORATION OF ST. STEPHEN'S CHAPEL, WESTMINSTER.

THIS drawing represents St. Stephen's Chapel as originally finished and decorated; for further description the reader is referred to the first article in the present number, which is to be read in connexion with this illustration.

TROSLEY TOWERS, KENT.

TROTTELCLIFFE, corrupted in recent years to "Trosley," is near Wrotham, in Kent, about half way between Sevenoaks and Maidstone, on the crest of a hill 686 ft. above sea-level, well-wooded, and commanding extensive views on the S. and S.E. down the valley towards Aylesford. Immediately underneath runs the well-marked "Pilgrim Road," known to Chaucer. Not many miles distant lies the beautiful old moated grange of Ightham.

For many years the country house of Sir Sydney H. Waterlow, Bart., has been at Fairseat, an interesting, but small, example of Early Georgian building, within a mile of Trosley. Having purchased an extensive estate, chiefly among the wooded height of Trosley, he has recently erected "Trosley Towers," a mansion of red brick with stone dressings, from the designs of Mr. E. R. Robson, F.S.A., architect, of which the hall is the subject of our illustration.

In the general plan of the house, the object naturally was to place as many rooms as possible towards the south, both for the sake of sunshine and the beautiful view. Thus, the main corridor runs along the back, and is entered from a *ports cochère* which is reached from a winding carriage-drive cut through the trees which protect the house from the north and east winds.

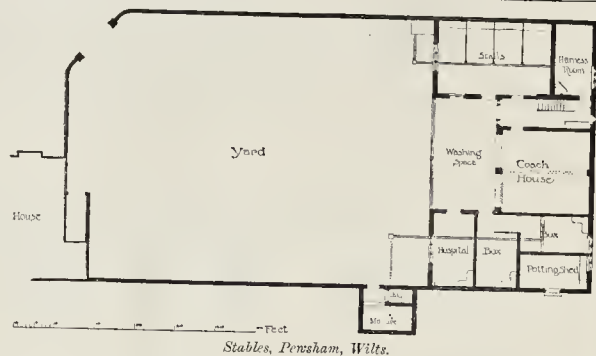
The Hall at Trosley Towers is another illustration of the importance attached by Mr. Robson to this leading feature, whether applied to a first-rate house, a first-rate school, or indeed to buildings of other kinds. In enlarging Mr. Henry Tate's house, at Streat-ham Common, a few years ago, he added a double billiard-room which, as a central hall, has proved the key of the plan in reference to the daily comfort of the house. In the plans prepared for the rebuilding of Ganton Hall, near Cromer, for Lord Saffell, the same treatment (which had been found in Vanbrugh's conception) was retained and greatly emphasized. In the case of the People's Palace at the East-end, he built the great central hall, called the "Queen's Hall," without knowing what other building was to follow.

In the present instance the hall is the general resort, and also the room whence the gardens and terraces are most easily reached. It extends vertically through two of the stories of the house, and its apparent size is increased by the manner in which the main staircase of oak is seen through one of its sides.

The builder of the house was Mr. Shepherd, of Bermondsey, and the clerk of works Mr. James Softly. The whole of the plumbing and drainage was carried out by Messrs. Dent & Helyer.

BATTERSEA POLYTECHNIC INSTITUTE.

We published in the *Builder* for March 29, 1891, the plan and the competition perspective of this building; the view here published is



from the drawing in the Royal Academy, and represents the front as modified since the competition; the whole is shown also from a rather different point of view. The chief alteration is in the introduction of the projecting bays beneath the end gables, which are certainly an improvement to the composition. Mr. E. W. Mountford is the architect.

STABLES, PEWSHAM, WILTS.

THESE stables are now in course of erection, and are being built of Cattybrook bricks, with Ham-hill stone dressings and Raabon tiles. The floors are paved with Staffordshire blue bricks, and the drainage is arranged so that all traps and gullies are outside. In addition to the loft for hay and straw, two grooms' bedrooms are included on the first floor. Messrs. Light & Smith, of Chippenham, are the builders; and C. E. Ponting, F.S.A., of Marlborough, is the architect from whose designs the building is being erected.

The drawings from which our illustrations have been taken are now on exhibition in the Architectural Room at the Royal Academy. We gave a view and plan of Pewsham House itself (now in course of erection, from the designs of the same architect) in the *Builder* for June 18 last.

CONGRESS OF ARCHAEOLOGICAL SOCIETIES.

THE fourth congress of archaeological societies in union with the Society of Antiquaries was held on Wednesday last in the rooms of the Society at Burlington House. Representatives from the following associations were present:—Royal Society of Antiquaries of Ireland, British Archaeological Association, Royal Archaeological Institute, Oxford Architectural and Historical Society, Oxford Archaeological Society, Norfolk and Norwich Antiquarian Society, Kent Archaeological Society, Bucks Archaeological Society, Midland Institute (Birmingham), Lancashire and Cheshire Antiquarian Society, Shropshire Archaeological Society, Sussex Archaeological Association, Surrey Archaeological Society, Derbyshire Archaeological and Natural History Society, Berks Archaeological Society, Yorkshire Archaeological and Topographical Society, Woolhope Field Club (Hereford), Somersetshire Archaeological and Natural History Society, Bristol and Gloucestershire Archaeological Association, St. Albans Archaeological and Architectural Society, Wiltshire Antiquarian Society, the Huguenot Society, Society for Preservation of Memorials of the Dead, and Society for the Protection of Ancient Buildings. The chair was to have been taken by Mr. A. W. Franks, C.B., President of the Society of Antiquaries, but in his unavoidable absence it was ably filled by Sir John Evans, the late President, and subsequently by Dr. Drury Fortnam, Vice-President.

The first subject for discussion was the Archaeological Survey of England. Mr. W. H. St. John Hope introduced the subject, explaining that as yet only three counties were completed,—namely, Kent, Hertfordshire, and Cumberland,—but that several others were now in progress. There was a brisk, but technical, debate as to the best marks and divisions to use in drawing up such maps, in which Messrs. Gomme, Parker, Sparrow, and Ferguson took

the chief part. Mr. Brassington, of Birmingham, drew attention to photographic surveys of antiquities, and pointed out how the Midland Institute had procured valuable series of antiquarian photographs by enlisting the aid of amateur photographic societies, directing their work.

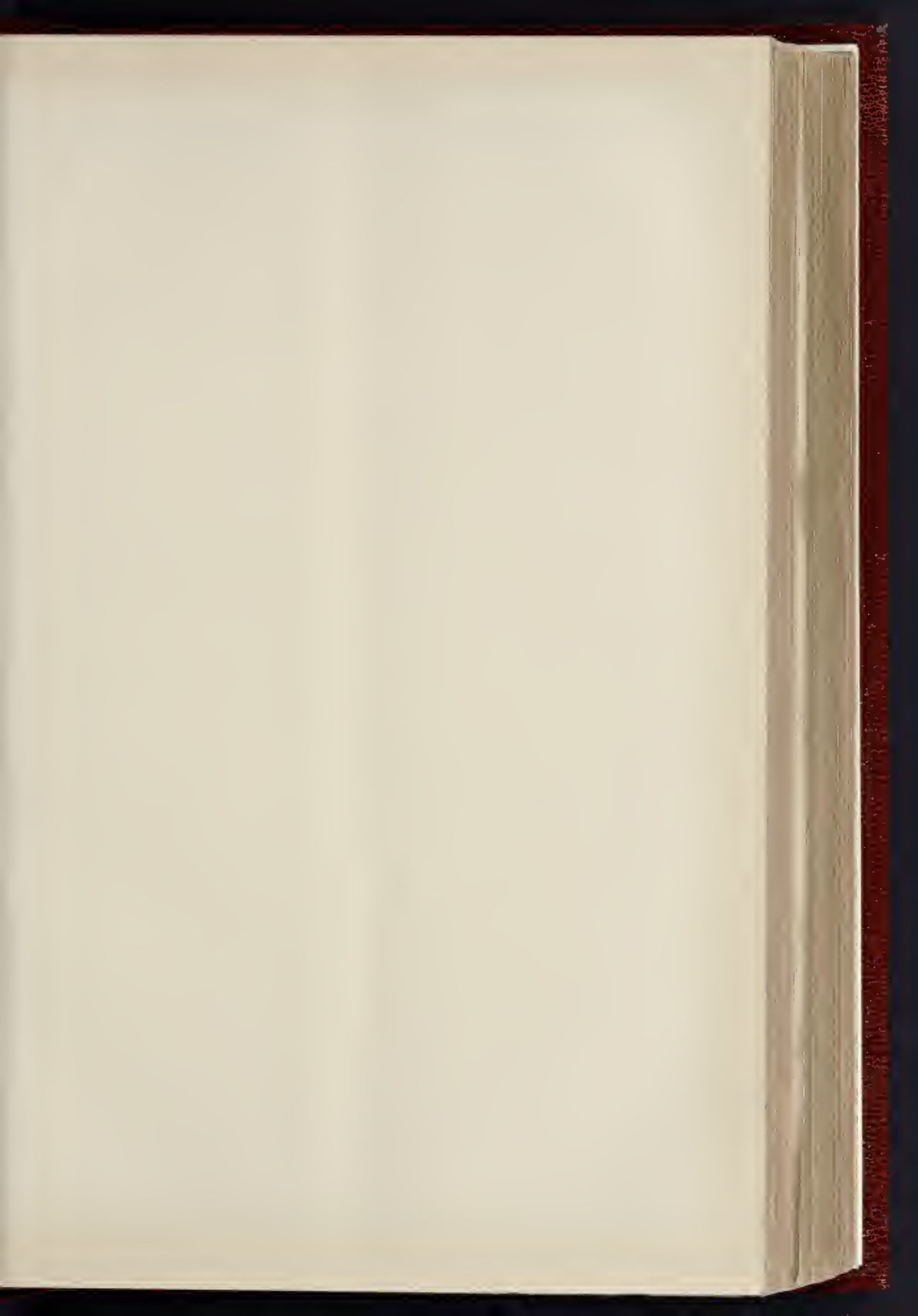
The second topic was the Classified Index of Archaeological Papers. Mr. Gomme announced that he had just completed the full index of all the papers issued by the local societies of Great Britain and Ireland, from their origin down to 1890, which will shortly be published. In addition to this, Messrs. Gomme and Hope have just completed for the societies in union an index of the archaeological papers published in 1891. Mr. Hope said that it was amusing to note the difference in the requirements of the associated societies for this index: one society applied for 1,200 copies, and another for only four!

The third subject on the agenda was the "Restoration" of Ancient Buildings, upon which Mr. Micklethwaite read an incisive and vigorous paper that bristled with good points, and yet was reasonable in its advice and conclusions. Mr. Parker spoke especially against the habit of scraping the old masonry, thereby obliterating masons' marks and other historic evidence.—The Chairman thought that three things combined hrough about the mischievous renewing of churches,—(1) a young and enthusiastic High Church parson; (2) an ill-instructed architect; and (3) an old lady with a long purse.—The Rev. W. Greeny, of Norwich, drew the attention of the Congress to the old stalls and choir fittings of the cathedral church, which he desires to turn into a "great preaching place."—The Rev. Dr. Cox raised a timely protest against the spoiling of old chancels by needless organ chambers, and instanced a case in which this had recently been proposed by an "F.S.A." architect, but the proposition had happily been overruled. Mr. Brassington proposed the printing of a good pamphlet on true and improper restoration, but Mr. Ralph Nevill said that that had been already done by the Institute of Architects. Several speakers laid the chief blame of mischievous church restorations on the architects; but Mr. Micklethwaite, in reply, pointed out that no architect had any *locus standi* to destroy or otherwise until he was called in by the clergyman.

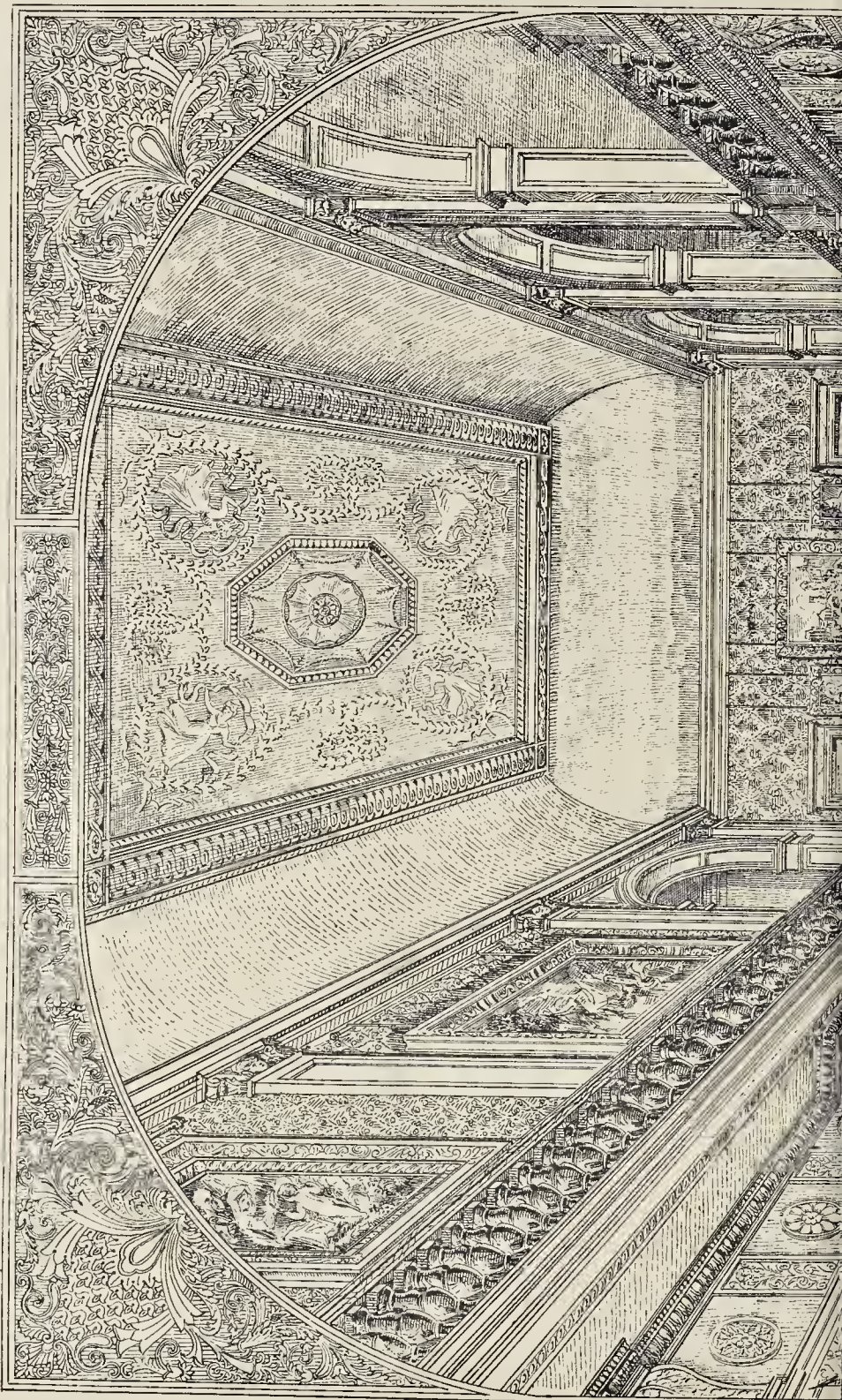
A fourth subject was the "Desirability of a New Skeleton Map of Roman Britain," introduced by Mr. Milman, Director of the Society of Antiquaries, but the project did not receive much support.

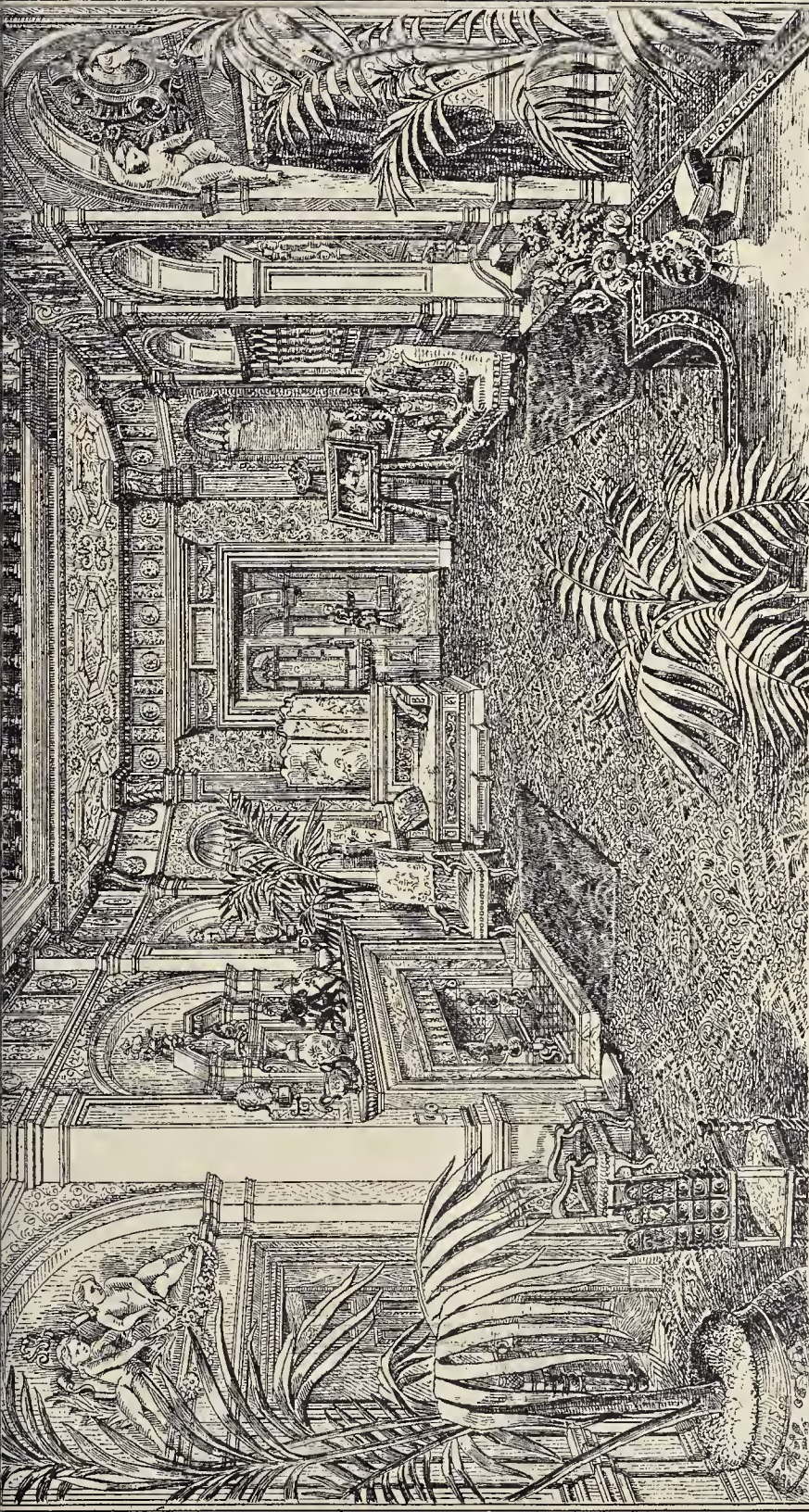
"The Desirability of Compiling a List of all Benefaction Tables previous to 1800 in Parish Churches" was brought forward by Mr. Gomme, and met, on the whole, with favourable consideration. It was stated by some that the work had been already done in the old Charity Commission Reports; but the Rev. Dr. Cox said that, so far as Derbyshire was concerned, those reports were captions, flimsy, and unreliable. Mr. S. W. Kershaw thought that the matter ought to be accomplished by the authorities of the Church.

A paper on "Local Museums," written by Mr. Payne, and read by the Secretary of the Society of Antiquaries, was full of good suggestions. It was decided, after an interesting and practical discussion, to refer the paper



THE BUILDER, JULY 23, 1892.





LEONARD R. ROSSIGNOL ARCHITECT
 Palace of Chamber's, 170 Broadway, N.Y.

INTERIOR OF GRAND HALL.

THOMAS TOWNLEY ARCHITECT
 100 Broadway, N.Y.

THE ENGRAVER'S NAME AND ADDRESS



THE BUILDER, JULY 23, 1892.

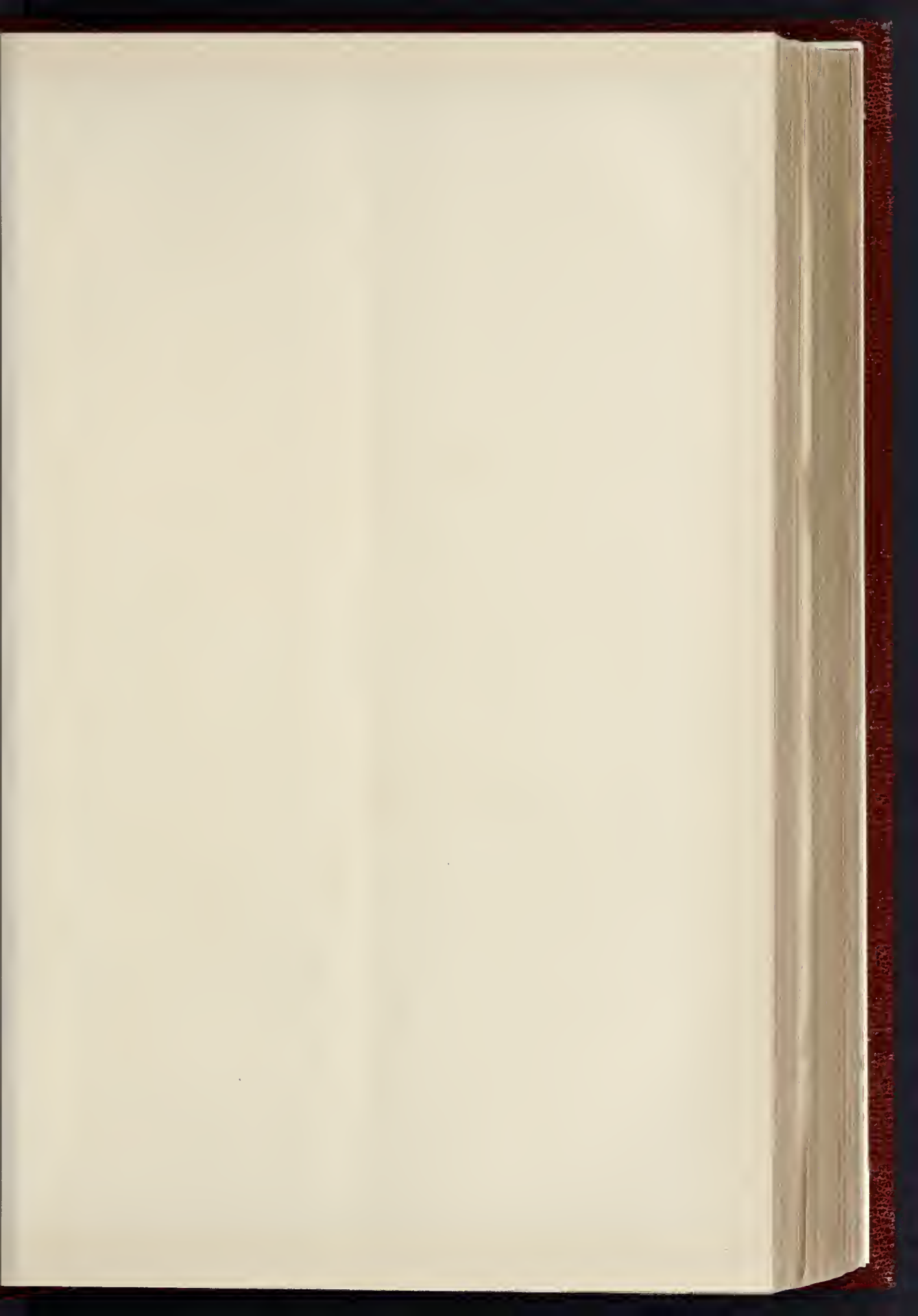




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STABLES: PEWSEHAM, WILTS.—MR. C. E. PONTING, ARCHITECT

Royal Academy Exhibition, 1892





Royal Academy Exhibition, 1892

BATTERSEA POLYTECHNIC INSTITU



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W. MOUNTFORD, F.R.I.B.A., ARCHITECT.

to the Standing Committee for its revision and enlargement, so that it might be issued as a guide to the due arrangement and carrying on of provincial museums. Allusion was made to the series of papers on local museums, showing up their deficiencies, and commenting on all good arrangements, which is now appearing in the *Antiquary*.

The members of the Congress dined together in the evening at the "Criterion," Mr. Franks, C.B., in the chair. Afterwards the President held a reception of the Fellows of the Society of Antiquaries at Burlington House to meet the Congress members. The suite of rooms contained a great variety of objects of interest specially displayed. The most important of these was the splendid collection of finger-rings, the property of Dr. Drury Fortnum, F.S.A.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

HAVING completed our digest of the evidence as to the pollution of the Thames, upper and lower, we now summarise that relating to the pollution of the Lea. After indicating the scope of the mortality tables submitted by the Medical Officer of Health, as bearing on the relation between disease and water supply, we condense a compendious statement by Dr. Frankland, the water examiner, on the past and present conditions of the two rivers. The statement was the basis of a long examination on bacteriological problems, which, as we have already stated, have been referred by the County Council to the Royal Society, which has appointed a special water research committee. It has also been stated incidentally by the Chairman of the Commission, Lord Balfour of Burleigh, that there is much in the detailed reports upon the rivers and their tributaries which is unsuitable for investigation by question and answer over the table, and must be remitted for consideration by an assistant commission.

The Pollution of the Lea.

Dr. Geo. Turner, M.B., D.P.H. Camb., Medical Officer of Health for the counties of Herts and Essex, &c., said that at the request of the London County Council he had examined the Lea and its tributaries, whose valleys comprised parts of Herts, Essex, and Bedfordshire. The population of the area would be between 143,688 and 145,799. About 95,000 persons living in towns and villages discharged sewage effluents, after more or less purification, into the river. For 85,000 the purification was efficient; for 5,500, in three villages, it was a "pretence of purification;" five villages, containing 7,000 inhabitants, ran unpurified sewage into the streams. About 40,000 live remote from the banks, and in rainy weather their drainage, greatly diluted, passed by ditches to the river. He had noted pollution from 367 houses, twenty-four mills, twenty-one farms, six public-houses, two schools, and five slaughter-houses or places where pigs were occasionally slaughtered, the inhabitants of the places numbering 2,000. In addition, at various places, such as Stansted, Standon, Branghing, Aspden, Widford, Horneal, &c., sewage enters the river through ditches and rain-water drains not directly connected with premises occupied by perhaps 2,000 persons. Sewage, sewage effluent, or slop-water from 100,000 persons reaches the Lea, and its tributaries, above the intakes of the water companies. Omitting those matings which go into sewers discharging upon sewage farms, no less than 8,896,250 gallons of malting water are turned into the streams. This malting water is highly charged with putrescible organic matters, and speedily becomes very offensive. An analysis of some malting water showed that it contained 135½ grains of organic matter per gallon, which would give 76½ tons as the total amount discharged into the river in one year. This pollution was called harley water, and, although it might not contain specific organisms, it supplied them with the means of living when they obtained access to the water. The safety of consumers depends upon three things:—1. The quantity of clean, spring water, which reaches the streams, and which serves to dilute and oxidise the organic matter contained in the sewage; 2. The length of the flow between the point of pollution and the intake in which oxidation may take place; and 3. The filtra-

tion which the water undergoes at the hands of the companies. The result of personal inquiries made from persons working mills on the rivers is that there has been a loss of 50 per cent. of water in the Lea, the Beane, the Mimram, the Kih, and the Ash, and none, or practically none, in the Stort. The pumping at the New River well at Broxbourne has reduced the level of an adjoining well by 14 ft., and at Stevenage the average height of the water in a well is 13 ft. less than it was five years ago. The filtration by the companies is probably as efficient as it can be made. In 1883, 1884, and 1886 at Hertford, and at Stansted in 1892, the consumption of unfiltered Lea water has produced typhoid. The possibility of improving river water by intercepting drains is much overestimated. Numerous analyses by several experts, and intimate knowledge of the state of affairs at Hertford, indicate that the treatment of the sewage there gives, not drinking water, but water which is quite harmless to a navigable river, and that the dark colour is caused by the soil over which it flows and the mismanagement of the Lea at this point. Above Hertford at Wheatthampstead (pop. 2,000) there is in operation a precipitation process so little efficacious that it does not remove the colour of blood from the sewage. At Whitwell, on the Mimram (800), the sewage is led by gravitation on to some land, but in time of storm all the sewage passes directly into the river. Wellwyn, on the Mimram (1,800), has a process of straining, but discharges a "foul sewage effluent." Harlow, on the Stort (3,000), discharges its sewage improperly; it flows off the land without going through it, at the rate of 60,000 gallons in twelve hours; and the effluent was described by Mr. Dixon as "ordinary sewage." Stevenage (3,300) and Watton (700), with a slaughter-house, drain directly into the Beane. These examples from a list of pollutions show that untreated sewage in large quantities reaches the rivers above the intakes. No improvement in the case of towns and villages will render the Lea water fit to drink while the land is used for agriculture and the river for transport, especially the transport of manure. It is not at all like ordinary stable manure, but is indescribably filthy and has every opportunity of being specifically contaminated. Much of it is deposited on the banks just above the intake of the East London Company. The quantity is about 50,000 tons a year, or ten times the excrement of the total population above the intake. We do not know how far filtration protects from typhoid fever; but the Caterham epidemic showed that a pollution so small that it could not be detected chemically was sufficient to poison an enormous quantity of water. If it should be proved that careful filtration does protect from typhoid fever this will not show that it will act equally well in the case of cholera. In 1886 the overflow of a specifically polluted ditch caused enormous harm wherever the foetid East London water was taken. In 1886 the filtration was probably defective, and the same misfortune might occur again. It is a mistake to use Lea water for a public supply, as it is impossible to stop the navigation of the river and the cultivation of the land. The Lea rises 85½ miles from the East London intakes, and it receives effluents or minor pollutions from Luton, 32,957; Wheatthampstead, 2,457; Hatfield, 4,120; Hertford, 8,800; Ware, 5,121; Stanstead Abbots, 1,405; Hoddesdon, 3,439; Broxbourne, 788; Cbesbut, 10,000; Chingford, 1,517. On the tributaries are several smaller towns.

In answer to many questions, Dr. Turner said that he regarded an effluent as efficiently purified for a navigable stream if it did not kill fish, stop up the stream, or create a nuisance. There would always be risk in using such a stream below the effluent discharge as a source of water supply. Still a river was the natural drainage for a purified effluent. At Wheatthampstead (2,450) there was in operation a kind of precipitation process so little efficacious that it did not take out of the sewage the colour of the blood of pigs that were being slaughtered in the town; and you could see the course of the effluent along the side of the stream for 20 or 30 yards. A similar pretence of purification was made at Wellwyn and Harlow. Five places that ran unpurified sewage into streams are Stevenage, Walkern, Watton, Wormley, Stansted Mount Fitchet, and Stansted in Essex. The evidence that the quantity of spring water is decreasing is that millers cannot run so many stones as they used to do, and that hede for watercress, which must

have spring water, have been damaged or gone out of cultivation at Coldharbour, Whitwell, Stansted, St. Margarets, Rye House, Amwell, and Hoddesdon. At Amwell two adjoining pumps of the New River Company dry the bed in two hours. At one place, when the owner complained of the loss of water, the Company ceased pumping. Anothertime the Company continued pumping, and the renewal of the plants cost between 200l. and 300l. Below Luton the beds have been given up because of the want of water, and not on account of the sewage effluent. "They cultivate watercress in sewage very often, and that is why I never eat them in London." Reminded by the Chairman that the tendency of the milling trade was towards the coast, for the grinding of imported grain, Dr. Turner said the mills on the Lea had ceased running, not because they had not the stuff to grind, but because they had not the water to turn the wheel. Better draining, no doubt, prevents floods soaking the land, but the loss of water is not so much complained of on the Stort, which runs over clay, as it is on the Lea. There is not a better sewage-farm in the country than that of Luton, but pumping stops from 3 a.m. to 8 a.m. The water then in the sewers is largely sunsoil water, but in the sewers is becomes coloured from the colour used in dyeing straw, and sometimes it is so highly coloured that it has to be pumped on to the farm. The population in the valley of the Lea has increased from 138,000 to 145,000 in ten years, and soon it will overlap the intake of the East London Company; and a river flowing through a town must be dirtied by the washing of the streets. There was no reason why all the sewage of towns should not be efficiently treated, and, if it was so treated, the only pollution from human beings would be the occasional pollution in time of flood from 47,000 people scattered over an area of 500 square miles. Whatever improvement might be made in sewage effluents, the river would not be a good supply for domestic purposes while used for navigation, because you might have a man on a barge suffering from typhoid and polluting the water close to the intakes, and one pollution there would be more dangerous than a greater pollution higher up. He had seen manure barges pumping filge water into the river and manure heaps drained by trenches. The manure which he described as contaminated contained foetal calves, entrails of fish, the sweepings of slaughter-houses, contents of house dust-hins, old beds and bedding, rags and clothes, straw and cinders. The higher land of the district was adapted to sewage-farms, and farm treatment was the best for sewage. Generally speaking there was plenty of available land. The valley of the Lea is not served by the New River Company; they absolutely refused to supply any of the villages on its course. All the water used locally is raised locally from wells in the chalk and otherwise.

Death Rates and Water Supply.

Mr. Shirley Foster Murphy, Medical Officer of Health of the County of London, submitted tables which had been prepared to enable comparisons to be made between the enteric fever death-rates of London and some other towns; also between the rates of London districts having the same water supply; and also between London populations having different water supplies. The London death-rate, he said, bears favourable comparison with the rate in other towns having public water supplies which are not excrementally polluted. The following are such towns, and they are arranged in the order of the average annual enteric fever death-rate for ten years, 1881—1890, per 10,000 population. There are fourteen names, besides that of London, which stands eleventh on the list:—

Portsmouth	4.9	Hull	2.5
Blackburn	4.1	Birkenhead	2.1
Preston	3.8	London	2.0
Salford	3.8	Brighton	1.8
Nottingham	2.9	Bradford	1.7
Cardiff	2.8	Bristol	1.5
Derby	2.8	Huddersfield	1.5
Liverpool	2.6		

A second table gives for thirty-nine districts of the Metropolis the death rates from enteric fever, diarrhoea, scarlet fever, measles, diphtheria, and all causes, and also the infant mortality. The names are arranged in the order of the death rates per 10,000 from enteric fever. The rates range from 2.17 in Limehouse to 0.66 in Plumstead.

A third table shows that there are consider-

* See last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 29, 47.

als differences between districts having the same water supply.

Then the districts are grouped under their respective sources of supply; and the enteric fever death-rate per million for 1885-1890 was as follows:—

Kent	1134	New River	107.74
Thames	123.9	New River and East	118.79
Kent and Thames	139.7	London	129.28
New River & Thames	142.2	East London	129.28

The inferences he would draw from the table was that the test was favourable, so far as it went, to the wholesomeness of London water as compared with that of other towns.

The figures appear to show that the water of the River Lea has been more capable than any other of causing enteric fever, and that the water supplied by the East London Company has been more injurious than that supplied by the New River Company.

Tables are added to show the relative prevalence of other zymotic diseases, some of which are not believed to be communicated by water, viz., diarrhoea, scarlet fever, diphtheria, and measles. The tables show broadly that the tendency to prevalence of each of these diseases has been greater in the populations supplied by the Lea than in the populations having other water supplies, and that the order of incidence observable in the case of enteric fever is not maintained by the other diseases. Nor has the precise order been maintained by enteric fever in each of the six years under consideration.

Of nineteen districts receiving water from the Lea, the following numbers had higher mortality than the rest of London:—13 from enteric fever, 9 from diarrhoea, 11 from scarlet fever, 10 from measles, and 9 from diphtheria. Of 20 districts not receiving water from the Lea, 4 had higher mortality than London from enteric fever, 7 from diarrhoea, 8 from scarlet fever, and 7 from diphtheria. This table, however, it was explained, was subject to qualifications, and it was only the beginning of a further inquiry. There are more causes than one at work in London producing enteric fever, and one problem is whether any cause has tended to raise the amount of fever above an average. There is no evidence that the water of London produces typhoid fever. If certain districts suffer more than others from enteric fever and more from other diseases at the same time, one is disposed to look at conditions in those districts which are not related to water-supply as the probable cause. Various local conditions outside water-supply may affect the prevalence of enteric fever in the towns with which London is compared. Salford, for instance, which stands high in the list for enteric fever, is surrounded by the Irwell, which is little better than a polluted sewer.

The Water Examiner's Account.

Dr. Frankland's statement embodied the following facts and opinions:—The River Thames receives, above the intakes, contributions of organic matter of animal origin,—"generally innocuous, although sentimentally objectionable." It may, however, be accompanied by zymotic poisons, typhoid fever, tuberculosis, or diphtheria. The risk is reduced by filtration, and by avoidance of flood waters. Still there is no "trustworthy guarantee" that the noxious matters are wholly removed. In ordinary weather a "considerable" and, in flood time, a "large" proportion of soluble organic matter makes its way down to the intakes. No company has sufficient storage to exclude flood-water altogether: the Grand Junction has only 3.5, and the Southwark 2.7 days' storage. The surface gravel supplies must be abandoned as population increases in the valleys. Notwithstanding the efforts of the Conservancy, analyses show that the water of the river is worse than in 1873,—that it contains 19 per cent. more of organic carbon, 13 per cent. more of organic nitrogen; but the water delivered in 1890 was 32 per cent. better than in 1868,—it was not so in 1891, which was a bad year for the operations of the companies. The improvement is both in matters in solution and matters in suspension. The filtration is better than in 1873. Still, the brightest and clearest water is not free from suspended matter. A ray of strong light shows it to be muddy, and a cubic inch has been found to contain many hundreds, and even thousands, of living organisms. On March 26, 1891, a cubic inch contained 25,912 living organisms. The water is "generally wholesome," but it is uncertain how far cases of

zymotic disease are traceable to it. There is no positive evidence that the filtered water is unwholesome, but was ought not to be dependent upon the efficient filtering plant of commercial companies. An epidemic of typhoid or cholera above the intakes would be attended with great risk to Londoners. The belief that water from between bridges was safe cost 25,000 lives in 1849 and 1854. Theoretically, storage and filtration may be a considerable safeguard, but there is not a little of trustworthy evidence of that. The outbreak of typhoid fever at Lausanne, in Switzerland, where 17 per cent. of the population were attacked, showed that infected water was potent to produce disease even after filtration. Normally safe water liable to zymotic pollution ought to be avoided where the lives of millions may be jeopardised. Therefore the Thames ought to be abandoned as soon as practicable. This opinion, expressed in 1874, the witness still held, notwithstanding improved storage and filtration. Even if filtration intercepts all germs, this one line of defence ought not to be trusted. At the intakes, the water almost always contains an enormous number of living microbes,—in extreme cases half a million in a cubic inch; on the average of six weeks, over a quarter of a million. In the six weeks storage and filtration effected a reduction as large as 98.5 per cent., and the average reduction of the five companies was 30 per cent.

The Kent Company's water is unaffected by weather, and is always clear and bright without filtration. The sole defect of this water is its hardness. It contains fewer microbes than the river waters "as delivered," but what they contain "immediately after filtration" he is investigating. The vast majority of these microbes found in potable waters are harmless; it is rarely that pathogenic bacteria are found—never in any water supplied to London; and it must not be concluded that they are never present. Only half a cubic centimetre of water can be examined. Several pathogenic organisms can be cultivated only in the bodies of animals; and they are therefore undiscoverable by Koch's gelatine plate process. A single glass of water might contain two or three typhoid germs, and yet it would be by the merest chance that one of them would be in the small quantity selected for bacteriological examination. These examinations are simply a quantitative test of the filtration; they prove in the case of London how efficient as a rule is the sand filtration; but the large reduction of even 98 per cent. is by no means an absolute guarantee that pathogenic organisms, if present, would disappear with the crowd. It is only, so far as we know, by the rejection for dietic purposes of water so polluted, that immunity from water-borne zymotic poisons can be secured.

The deep well water of the Colne Valley Company and the Tottenham Local Board are similar to the Kent Company's as regards organic purity; but they are softer—Tottenham by 5 degrees and Colne Valley by 20; but the Tottenham is delivered in its natural condition, and the Colne Valley is softened by Clark's process. The temperature of these well waters is nearly uniform throughout the year—far removed from freezing point in winter, refreshingly cool in summer.

We must break off here this week, although we have not yet finished Dr. Frankland's statement, the remainder of which is deferred for want of space.

The Commissioners held a sitting on Wednesday, chiefly for the purpose of receiving supplementary details from the representatives of the Companies.

TRADE FESTIVITY.—On Saturday last the employees of Messrs. Vaughan & Evans, Kirby, brakes, and Farringdon-road, gas engineers, &c., had their annual outing. Accompanied by Mr. Vaughan, Mr. Geo. Vaughan, and the heads of departments, they formed a numerous party, and were accommodated with special carriages attached to the nine o'clock train from Waterloo, whence they proceeded to Horsley. At Horsley a number of trucks were in waiting to convey them to Ripley, Surrey, where, after a cricket match on the village green, dinner was served in a large marquee erected in the grounds of the "White Hart" Hotel. After dinner, groups of the party were formed to explore the surrounding country, some on foot, some in carriages, all meeting again about eight o'clock, when the brakes were again in readiness to convey them to Horsley, where in due course the train arrived, the carriages filled, and with South-Western punctuality reached Waterloo soon after ten o'clock.

COMPETITIONS.

QUARANTINE HOSPITAL, CAPE TOWN, SOUTH AFRICA.—We are informed that the Municipality of Cape Town have awarded the premium for the best design of a Quarantine Hospital for Infectious Diseases to Mr. Wm. H. Field, architect, of that city, and formerly of Plymouth, Co. Devon, and London, England. The cost is estimated by Government at 13,000.

NEW SUNDAY SCHOOLS, JOHN STREET CHAPEL, BEDFORD-ROW, W.C.—At a meeting of the School Trustees, held on the 18th inst., the design submitted in this competition by Mr. F. T. W. Goldsmith, of 1, Verulam-buildings, Gray's Inn, W.C., marked "Robert Raikes," was selected; and a premium of 52.5s. was awarded to Messrs. Keene & Drake, of 41, Bedford-row, whose design, marked "Experience," was placed second in the competition.

WOMBWELL BOARD SCHOOLS.—Seventeen sets of designs were sent in to this competition, and reduced by the Board to four sets, which were submitted to Mr. Innocent, architect, Sheffield. His report was in favour of Messrs. Butterworth & Duncan, Rochdale, who have been appointed architects by the Board.

BOARD SCHOOL, NEWPORT, MONMOUTHSHIRE.—An extraordinary meeting of the Newport School Board was held on the 18th inst. at the offices of the Board, Temperance-hall, Newport, to consider the plans submitted for a new school to be erected in Durham-road (Caeleon-road). The Sites and Buildings Committee reported in favour of two sets of plans, viz., that of Mr. Alfred Swash and Messrs. Lawrence & Fox, and requested the Board to make a selection from them.—Mr. T. H. Morley proposed the adoption of the plans of Mr. Alfred Swash. This was seconded by the Rev. O. D. Campbell.—Mr. W. Clifford Phillips proposed that Messrs. Lawrence & Fox's plans be accepted.—On being put to the vote, the designs of Mr. Alfred Swash were accepted by six votes as against four given for those of Messrs. Lawrence & Fox.—The school intended to be built is one for three departments, viz., infants, boys, and girls. An acre of land has been purchased from the Clytha Estate for £1,000. Accommodation will be provided for 700 children in all, viz., 300 infants, 200 boys, and 200 girls. The estimated cost of building is £3,700.

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—On July 20 a visit was paid by the Society of Engineers to the A. B. C. Sewage Works, Kingston; the Southwark and Vauxhall Water Co.'s Works, Hampton; and Messrs. Willans & Robinson's Works, Thames Ditton, four horse coaches being engaged for the conveyance of the party. The Kingston Sewage Works have been constructed for treating, by the Native Guano Company's processes, the sewage of 35,000 people, but with certain comparatively inexpensive additions it is said that they will meet the requirements of a population of 50,000. At present the sewage being treated is that of a population of 39,487, including Surbiton and Hampton Wick.—The Southwark and Vauxhall Water Company's Works at Hampton were commenced in accordance with the provisions of the Metropolitan Water Act, 1852, the first supply being pumped from Hampton to Battersea, to be there filtered and distributed, on July 5, 1855. In 1867 additional works were commenced on the adjoining land, having for their principal object the supply of the western portion of the district, these were completed and taken into use in the spring of 1870.—Messrs. Willans & Robinson's Works at Thames Ditton were started in the year 1881 for the construction of steam launches and yachts, and for the manufacture of the marine form of the Willans Engine.

LIVERPOOL ENGINEERING SOCIETY.—The Liverpool Engineering Society visited, on the 15th inst., the Fryer's Reifeuse Destructor, erected by the Corporation at their wharves in Chisenhale-street. Mr. H. P. Boulnois, City Engineer, conducted the party over the premises and wharves. The destructor, which was formally opened in October, 1891, although it had been more or less in use for some little time previously, consumes 600 tons of refuse per week. During the visit Mr. Boulnois explained to the visitors a new arrangement he had introduced for tipping the refuse into the furnaces without the labour of shovelling. By this contrivance the stuff is tipped into a tank divided into compartments, this tank being wheeled by mechanical means

over the furnace openings, and its contents dropped through the bottom.—Subsequently the members visited the works of the Liverpool Cold Storage and Ice Company in Williamson-square, and inspected, under the direction of Mr. M. C. Bannister, A.M.I.C.E., manager, a number of processes of refrigeration.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Election of Vice-Chairman.—Two candidates were proposed for the office of Vice-Chairman, vacant by the election of Mr. Hutton as Chairman. The two candidates proposed were Mr. Charles Harrison and Mr. Fardell. Mr. Harrison was elected, on a division, by a large majority, *i.e.*, by 71 for to 28 against.

The Adjournment for the Summer Recess.—On the motion of Dr. Collins, it was resolved

“That the Council at its rising on Tuesday, July 26, do stand adjourned for the summer recess until Tuesday, September 27, and that no Committee do meet after the date of the Council’s adjournment until Monday, September 19, unless in a case of urgency which will, in the opinion of the Chairman of the Committee, not admit of delay; provided that the Chairman of the Council may convene a meeting of the Council during the recess if he deem it necessary to do so.”

The Proposed New Street from Holborn to the Strand.—Mr. Frederic Harrison, Chairman of the Improvements Committee, proposed the adoption of the Improvement Committee’s report on this subject. We gave, a fortnight ago, the substance of this report, together with a plan of the proposed street.

Mr. Ranyard moved, as an amendment:—
“That in the opinion of the Council, the proposed new street from Holborn to the Strand should follow the line recommended in the report submitted to the Council by the Improvements Committee on July 21, 1891,* namely, beginning from the Holborn end of Little Queen-street and trending westward; and that, subject to this alteration, the recommendation be adopted.”

Mr. Fargnhar seconded the amendment, which was rejected by a large majority, and the continuation of the debate was adjourned to a special meeting to be held this Friday, June 22.

Southern Approach to Tower Bridge.—The Improvements Committee also submitted proposals for forming a southern approach to the new Tower Bridge, but the consideration of this part of their report was also adjourned.

Vauxhall Bridge.—The Bridges Committee brought up a report recommending the rebuilding of Vauxhall Bridge, but the consideration of this, too, was adjourned.

Bars and Gates.—On the recommendation of the Highways Committee, it was referred to the Parliamentary Committee to prepare a Bill giving the Council power to remove a large number of bars and gates.

The London Water Supply.—The Special Water Committee brought up a report stating that in July last they accepted an offer by the Royal Society to make investigations into the question of the vitality of microscopic pathogenic organisms in water, and agreed to contribute a sum of 250*l.* towards the expenses of such investigation, a similar sum being contributed by the Government Grant Committee. They had recently received from the Royal Society a preliminary report on the subject, and this had been followed by a letter intimating that the amount granted by the Government and the Council would probably have been exhausted early in the ensuing winter, and that the Government Grant Committee had granted a further sum of 250*l.* provided that the Council saw its way to contribute a like sum. The Committee were of opinion, after giving the subject full consideration, that the Council should continue its assistance, but that it should be understood that the amount to be contributed is to be regarded as a final payment. With this proviso they recommended that the Council do contribute a further 250*l.* towards the expenses of the investigations now being carried on by the Royal Society.

In answer to Dr. Collins, it was stated that the investigations in question were in the hands of Dr. Percy Frankland and Professor Marshall Ward.

The report, on the motion of Mr. Bassett Hopkins, was adopted, and
After discussing other matters the Council adjourned.

Correspondence.

To the Editor of THE BUILDER.

“CHANGES AT THE INSTITUTE.”

SIR,—Mr. W. Pite’s letter in your last issue makes it still more difficult to understand his drift, and that of those who act with him. They cheered me when I repudiated the idea that an examination could be any test of a man’s fitness to be an architect; and yet we find Mr. Pite, immediately after, asking that the Examination shall contain some test, and that of a competitive character, of a man’s artistic talent.

Now, if it be impossible to test a man’s power of applying the rules of construction, hygiene, and other branches that are more or less of the nature of exact sciences, how on earth can we test a man’s artistic capacity? And who is to be the judge? Surely Mr. Pite and his friends will not maintain that the power of making a good paper design necessarily involves the power of carrying out properly a good and artistic building?

There is one way, and one only, of treating examination in art, and that is by insuring that the student has a close and intimate knowledge of old work. It may be possible to stimulate further exertion by a judicious system of prizes, but no one will, I should think, assert that prize-winning is any test of a good architect.

The party who are moving in the matter do not seem to have made up their minds what they want. At one time they are against all examinations and diplomas, and the next strenuously endeavouring to establish a strict diploma in art, in which, above all things, diplomas have ever proved valueless. At any rate we may fairly challenge them to let us know precisely what they do mean.

RALPH NEVILL, F.S.A.

The Students’ Column.

CONCRETE.—IV.

HYDRAULIC LIMES (continued).—STORING.

AL limes and cements have a tendency to absorb moisture, and if they are left too long in a damp atmosphere, they will be entirely spoilt. As we have already seen in the case of rich limes, moisture causes the hydration of the lime, converting the quick-lime (calcic oxide) into calcic hydrate, the latter having two or three times the bulk of the former. The same action takes place in hydraulic limes, but not to so great an extent. For this reason, however, manufacturers frequently warn their customers that, if any ground lime be not used at once it should be emptied out of the bags, as otherwise the expansion of the lime would probably hurt them. The lime can be stored either in casks or on a dry floor in a warehouse, and may then be kept for some weeks, or even months, without detriment. This air-slaking causes the lime to set more slowly than when fresh, and this is frequently an advantage. For works in running water, where rapidity of set is necessary, ground lime is often used fresh.

Uses.—Hydraulic lime cannot, of course, be used for as many purposes as Portland cement. No one would think of using it now for the surface of paving, for floors, sewers, moulded work, or artificial stone; but it is largely used for concrete in ordinary foundations, and for mortar; it has also been employed successfully for concrete in the walls of buildings, but in England at any rate, it is now superseded for that purpose by Portland cement. Mixtures of lias lime and Portland cement have also been used for the matrix of concrete, the result being, of course, a stronger concrete than if the matrix had been entirely of lime. But in mixtures of this kind great care must be exercised that the lime is thoroughly slaked before the cement is added to it, as otherwise the concrete may “flow.” We shall have more to say about mixtures of lime and cement hereafter.

SELENITIC LIMES OR CEMENTS.

History.—Selenitic lime or cement was first made and patented by General Scott about

1870, and a company was formed to carry on the manufacture of it. The patent expired some years ago, and selenitic lime is now made at many lime and cement works in various parts of the country, but especially from the lias lime in Warwickshire and Leicestershire.

Composition.—The invention consisted in the addition of a certain quantity of sulphate of lime to the natural lime. Sulphate of lime (CaSO₄) occurs naturally in various forms, as selenite, gypsum, and alabaster. It is from the first of these that selenitic lime received its name. Plaster of Paris is calcined gypsum, and Robinson’s cement (to be mentioned hereafter) is calcined alabaster. Keene’s, Martin’s, and Parian cements also consist chiefly of sulphate of lime. But the point, in which selenitic lime differs from all these, is that the sulphate is present only in a small quantity, and does not form the bulk of the lime or cement. In fact, about 5 per cent. of plaster of Paris added to 95 per cent. of lias, converts it into a selenitic lime. The better the natural lime is, the better, it is said, will be the selenitic lime manufactured from it; that made from grey lias will be inferior to that made from lias lime. This statement is not confirmed by Mr. Grant’s experiments already quoted. (Table II.)

Tensile Strength.—There can be no doubt that the process increases both the cohesive and adhesive strength of limes to a great extent, but Mr. Grant’s tests* do not show as great an increase of strength as do those published by the Selenitic Company. Perhaps this is not to be wondered at. We have already (chapter iii.) given a table based on Mr. Grant’s experiments, showing the tensile strength of different mortars, some of which were made from selenitic lime. The experiments go to prove that, at the end of twelve months, a mortar composed of one part of selenitic lime and five parts of sand is equal in tensile strength to a mortar composed of the same lime (but without plaster of Paris) and three parts of sand. Selenitic treatment improved the grey lime 100 per cent. when kept in air and 109 per cent. when kept in water, but improved the lias lime (No. 2) only 57 per cent. in air and 66 per cent. in water, but the strength of the latter lime when made into mortar with six parts of sand was about 25 per cent. more than a similar mortar made from the former.

Adhesive strength.—We have already said that the selenitic treatment improves the adhesive strength of limes. The following table, in proof of this, has been compiled from the circular issued by the Selenitic Cement Company. It shows the force per square inch of mortar joint required to tear apart bricks after they had been nited for twenty-eight days by mortars of various kinds:—

TABLE V.

Adhesive Strength of Selenitic Limes, &c.

Kind of Lime or Cement.	Proportions of Lime or Cement and Sand.			
	1 to 1	1 to 1 1/2	1 to 2	1 to 3
White Chalk Lime.....	lbs. 4 1/2	lbs. 6 1/2	lbs. 12 1/2	lbs. 10 1/2
“ Lias Lime.....	9	6 1/2	20	20
“ Selenitic.....	27	21	20	20
Portland Cement.....	—	23	16 1/2	15 1/2

Compressive Strength.—The series of experiments made by Mr. Grant, and already mentioned, shows that concrete made of selenitic grey lime, gravel, and sand is 71 per cent. stronger than a similar mixture of ordinary grey lime, gravel, and sand, and that the selenitic treatment increases the strength of lias lime concrete about 38 per cent. These figures are the average of thirty tests of 6-in. cubes in each case. But the strongest selenitic lime tested by Mr. Grant, namely, selenitic English lias, gave results far below those given by Portland cement, tested in the same manner. The resistance to crushing of 6-in. cubes of concrete, made from one part of selenitic English lias and six parts of gravel and sand, was 9.28 tons, while similar cubes of Portland cement concrete crushed at 35.19 tons.

Setting.—Like all other limes and cements it should be kept perfectly dry, if not used fresh.

Uses.—Selenitic lime is used in mortar and concrete, but opinions differ as to the value of the treatment. Certainly engineers do not use

* We published the plan of this projected street in the *Builder* for July 25 last year.

* “Proceedings of the Institution of Civil Engineers,” vol. lxxi. (1879-80), part iv.

it in very important works, but prefer Portland cement. A series of experiments, made by Mr. E. C. Clarke in connexion with the Boston Main Drainage Works (1878-84), convinced him that scientific treatment "had not improved the cement sufficiently to compensate for the increased cost." The late G. E. Street, E.A., used scientific lime in the concrete foundations, &c., of the Law Courts, after its value had been demonstrated by a series of experiments carried out by one of his clerks of works, and it was used in several other important buildings about the same time. It is more frequently adopted for plastering than for concrete, and has been used in that manner for many large works, including the Law Courts and the Manchester Town-hall.

GENERAL BUILDING NEWS.

NEW BUILDING, GLOUCESTER.—On the 12th inst. the new Guildhall, erected in Eastgate-street, Gloucester, was opened. At the opening ceremony Mr. G. H. Hunt, of London, the architect, read a description of the building, from which we take the following:—"The various offices requisite for the working of the Corporation business are all placed on the ground floor for facility of access. The Council-chamber, committee-rooms, Mayor's parlour, and public hall are placed upon the first floor, so that they may be used separately or together according to requirements, without interfering with the offices on the ground floor. Additional offices, caretaker's quarters, and kitchens are on the second floor, and rooms for office purposes, storerooms, and collars are provided in the basement. Retiring rooms and lavatory accommodation are arranged on the various floors. The Council-chamber, on the first floor, is arranged in a central position, and has a carved and panelled ceiling. The hall (40 ft. by 80 ft.), placed next New Inn-lane, occupies the whole width of the site. The main front of the exterior next Eastgate-street, is executed in Monk's Park stone, and is designed in the Renaissance style, somewhat severe in treatment. The other fronts, towards New Inn-lane and the courtyard, are executed in brickwork with stone strings and cornices, and kept quite plain. In the interior, polished Hopton Wood stone has been largely used for the columns, mantelpiece, and balustrading; the joinery generally is in oak, vitreous mosaic paving has been used in the hall, and the whole of the floors throughout are fireproof. Fibrous plaster has been freely used for the purpose of decorating the Council-chamber and gallery, public hall, and entrance hall ceilings. The heating and ventilation was carried out by the late Mr. W. W. Phipson. The scheme adopted is "low pressure steam" divided into circuits, combined with direct supplies of fresh air admitted vertically and also through radiators. The extraction of vitiated air from the public hall and Council-chamber is by means of ventilating sun-burners, and in the office by means of air-flues. The works generally have been carried out by Messrs. Dowers & Co., of Hereford, the contractors. Messrs. Bennett & Ingle were the contractors for the fireproof flooring; Jackson & Sons, fibrous plaster work; C. Smith & Sons, locks, door, and window furniture; Best, vitreous mosaic floor; Smith & Stevens, lifts; Stride & Co., gas-mains and sun-burners; the late W. W. Phipson, heating apparatus; Pomeroy, cooking apparatus and gas-stoves; Frith, sculpture and carving; Conway Jones, general painting and decoration; Sessions & Sons, lavatory and sanitary fittings; Beaven & Co., gas-fittings and dressco decoration. Mr. Robert Griggs, of London, was the quantity and measuring surveyor; and Mr. F. Feltham has acted as clerk of the works. We gave a view and two plans of the building in the *Builder* for July 13, 1889.

CHURCH INSTITUTE, WOLVERHAMPTON.—The foundation-stone of an institute in connexion with St. Peter's Church, Wolverhampton, was laid on the 18th inst., by Lady Hickman. The structure, when completed, will be of two stories, containing on the ground-floor two class-rooms, over which will be placed one large room for meetings. A large committee-room and a smaller room will be on the upper floor. Another room for gymnastics will be placed behind the main block. The buildings will be of red brick with Cornish stone dressings. The cost of the portion now being erected will be 2,500*l.*, exclusive of the fittings and furnishing. The contractor is Mr. W. H. Lovatt, and the architect Mr. T. H. Fleeming, both of Wolverhampton.

FREE CHURCH, ST. ABB'S, BERWICK.—A new Free church was opened at St. Abb's, Berwickshire, on the 15th inst., by the Rev. Principal Rainy, Edinburgh. The building will accommodate about 300 persons, and has cost over 2,000*l.* The church, which is constructed of Swinton stone, is oblong in plan, with a square belfry at the eastern end (under which is the main entrance), and a vestry at the opposite or western end. The roof is of open timber, and all the pews and interior furnishings are of varnished pitch-pine. The windows are filled in with antique cathedral glass, and at the

western end of the building, over the pulpit, is an ornamental rose window of stained glass. At this end of the church there is also displayed a mural bronze tablet, set in a black marble border, which the inhabitants of St. Abb's have erected to the memory of Mr. Howard Graham Usher, the deceased son of the donor. The building is lighted entirely by electricity, connexion having been established with the electric power which supplies the mansion-house of Northfield. The architect was Mr. J. L. Murray, of Biggar.

BATHS, BURSELEM.—On the 14th inst., Mr. Rienzi Walton, M.Inst.C.E., an inspector under the Local Government Board, held an inquiry in reference to an application by the Corporation to borrow 9,000*l.* for public baths, 5,000*l.* for the purchase of about twenty-two acres of land to be laid out as a park and recreation ground, 3,750*l.* for public improvements, and 1,600*l.* for sewage purposes. The Borough Surveyor, Mr. F. Bettany, described the various works. There was no opposition.

TECHNICAL SCHOOL, HOLMFIRTH, YORKSHIRE.—On the 16th inst., the foundation-stone of a new Technical School for Holmfirth was laid. The estimated cost of the new building is about 3,000*l.*, and it is being erected from plans prepared by Mr. Joseph Smith, Holmfirth and Sheffield, who gained the first premium in the competition promoted by the Building Committee. It will be in the Elizabethan style.

TEMPORARY SANATORIUM, CARDIFF.—On the 16th inst. a temporary sanatorium was opened at Cardiff by Alerman T. W. Jacobs. The sanatorium is designed to provide accommodation for cases of infectious diseases pending the erection of the complete sanatorium, to which it will afterwards form a supplemental pavilion. It is erected on a portion of the site procured for the permanent building on the floors, between the banks of the Taff Vale Railway and the Ely river, and provides for the accommodation of twenty-four patients. The buildings, which are of timber framing covered with corrugated iron over a layer of felt, and lined with match-boarding, are raised to a height of about 5 ft. above the general level of the site, on a foundation of brickwork. The main ward pavilion, which is a one-story building, consists of a central administration block, containing matron's sitting-room, bedroom, kitchen, scullery, and stores, the matron's rooms being divided from the kitchen department by a corridor communicating with the main corridor connecting the wards, on the opposite side of which are the nurses' bedrooms and sitting-rooms. The two wards which terminate the main corridor are for males and females respectively, and each provides accommodation for twelve patients. They are 60 ft. long by 20 ft. wide, and are 11 ft. high to the ridge, and are heated by two Gill stoves in each ward, with flues carried overhead to the roof on the outside of the building. The ventilation is secured by means of fresh air inlets underneath each ward bed and a ventilated ridge running the whole length of the wards, in addition to which cross ventilation can be obtained from the fanlights of the windows and lantern lights, all of which are made to open. At the end of each ward is a bathroom. Opposite the entrance to the site is situated the laundry block. The brick foundation, earthwork, and the whole of the plumbing and sanitary arrangements have been carried out by corporation workmen. The corrugated iron superstructures were supplied and erected by Messrs. Humphreys, Limited, of London; the water and other stoves, &c., by Mr. John Williams. The planning and disposition of the various blocks, and the engineering, drainage, and sanitary matters generally, have been carried out by the Borough Engineer, Mr. W. Harpur.

ST. PETER'S NEW SCHOOLS, WORCESTER.—On the 15th inst., the Bishop of Worcester opened the new St. Peter's schools, which have been erected in Severn-street, Worcester. The site upon which the new buildings are erected was given to the parish by the Royal Porcelain Works Company. The new buildings adjoin the old schools, and are constructed with red bricks and roofed with tiles. The ground floor comprises a boys' school, 60 ft. by 32 ft., and 15 ft. high, an entrance corridor, lavatory, cloak lobby, and master's room. The old boys' school will be converted into three class-rooms, which will communicate with the new room by a corridor. Accommodation is provided for 204 boys in the school-room, and 152 in the class-rooms. The floor of the new school-room is composed of wooden blocks, laid in a pattern square a foundation of concrete. The first floor, immediately above the boys' department, comprises a girls' school, 65 ft. 9 in., by 32 ft., and 19 ft. high, a lavatory, cloak-rooms, and front and back staircases, while the old school-room adjoining is converted into three class-rooms. The infants' school is at the rear. The whole of the new schools and class-rooms are heated with hot water, the apparatus for this, and also the gas-pipes and fittings, having been supplied and fixed by Messrs. J. Ward & Sons, of Worcester. The contract price for the schools was 2,211*l.*, and the work has been carried out by Messrs. J. S. Wood & Sons. The architects were Messrs. Yeates & Jones, of Worcester.

SANITARY AND ENGINEERING NEWS.

THE WATER SUPPLY OF CROMER.—The Cromer Waterworks Company, in view of the growing popularity of the town, have been engaged during the last two years in erecting a second well capable of giving a supply considerably in excess of that hitherto available. These wells are situated more than half a mile outside of the town. Owing to the sandy character of the upper strata, great difficulty was experienced in sinking the new well, which varies from 8 ft. to 5 ft. in diameter, and has been carried to a depth of 183 ft. from the surface. The chalk was reached at a depth of 138 ft. below the surface, and, with the object of ensuring the purity of the supply by excluding all percolations from the strata above, the well has been lined to a depth of 151 ft. with hickwork and iron cylinders. The new bore-hole, which is 20 in. diameter, extends from the bottom of the well to a further depth of 40 ft. Two headings, each 6 ft. by 4 ft., have been driven for a distance of 100 ft., one serving as a connecting link between the new well and the old bore-hole, by means of which the town has hitherto been supplied. The permanent water-level in the new well and old bore-hole is 110 ft. from the surface. A new set of pumps and engine have been erected, designed to lift 12,000 gallons per hour, and the entire system is used in duplicate, so that in the event of a breakdown,—an eventuality by no means likely to happen,—a failure in the supply will, practically speaking, be an absolute impossibility. The water has been examined by Professor Frankland, F.R.S., the well-known water analyst, and he reports on samples taken from each well as follows:—"The two samples are of most excellent quality for dietetic purposes. They are absolutely free from all evidence of previous sewage or animal contamination, whilst for chalk water they are of very moderate hardness. Cromer may be congratulated on being supplied with one of the best waters in Great Britain." The works have been carried out, under the direction of Mr. J. C. Mellis, of London, by Messrs. Thomas Tilley & Sons, of Walbrook, London, the pumps and machinery being supplied by Messrs. Robert Warner & Sons, of Walton-on-the-Naze, while the buildings at the surface have been erected by Mr. John Newman, of Cromer.

PONTYPRIDD JOINT SEWERAGE SCHEME.—The last brick of the Ystradfydwg and Pontypridd joint sewer was laid on the 30th ult., at Nantgarw, by Mr. D. Laysdon, chairman of the Pontypridd Local Board. The scheme had cost 150,000*l.* The length of the sewer is 18 miles. The section of the sewer varies from 3 ft. 4 in. by 2 ft. 6 in. to 5 ft. 6 in. by 3 in., the syphons under the river being 2 ft. 9 in. There has been 34 miles of tunnelling, the average depth is 15 ft., and three different valleys have been traversed. The contractors were Messrs. W. R. Parker & Co., of Cardiff. The engineer was Mr. Chatterton, and the resident engineer was Mr. Hillins.

SANITARY BY-LAWS, CARDIFF.—At the monthly meeting of the Cardiff Sanitary Authority, held on the 13th inst., the Building By-laws for the whole of the district of the Authority, as amended by the Local Government Board, were agreed to. The by-laws for the regulation of slaughter-houses in certain parts of the district were also approved. The Surveyor of the Authority, Mr. Wm. Fraser, Assoc. M.Inst.C.E., &c., presented plans for the drainage of Ely, at a cost of 1,000*l.*, the consideration of which was referred to a sub-committee.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, IRON ACTON CHURCH, GLOUCESTERSHIRE.—The window which has been placed in Iron Acton church, to the memory of the late Captain Liddon, was dedicated on the 2nd inst. The subject of the window is "The Call of St. Matthew," and the design was furnished and executed by the firm of Messrs. Joseph Bell & Sons, Bristol.

ST. MARY'S CHURCH, SHREWSBURY.—The fine church of St. Mary, Shrewsbury, has just received various embellishments in the chancel. An entirely new floor has been laid with encaustic tiles and polished Anglesey marble steps. The tiling is by Messrs. Godwin & Son, of Ingwardine Works, Wiltington, Hereford, who have used their well-known "Antique" encaustic tiles with great success, the whole being of a pleasing and harmonious tone. A stone screen has been erected between the choir and the chancel, and wrought-iron grilles have been placed in the sanctuary arcade. The architect for the work was Mr. A. E. Lloyd Oswell, A.R.I.B.A., of Shrewsbury.

DECORATION OF THE LEES TOWN HALL.—The Corporate Property Committee of the Lees Cor-

poration, at a special meeting on the 15th inst., again had under consideration the question of cleansing and decorating the Town Hall. Mr. Craze, of the firm of Messrs. Craze & Sons, London, attended with designs and estimates, amounting to 5,710*l.*, of which 2,560*l.* was in regard to the Victoria Hall. He said that it would be impossible to complete the work before the holding of the Triennial Festival. The committee adjourned on the understanding that a meeting would be convened to specially consider the estimates and designs submitted by Messrs. Craze & Sons, as well as those sent in by Messrs. Dobie & Sons, of Edinburgh.

FOREIGN AND COLONIAL.

FRANCE.—Monsieur Huillard, Honorary Architect to the City of Paris, and Monsieur Rigault, Architect of Civil Buildings, and a former winner of the second Grand Prix de Rome, have just been named Chevaliers of the Legion of Honour.—M. Cordouier having obtained, in consequence of the new vote of the jury, the Medal of Honour for Architecture at the Salon, the first-class medal originally accorded to him has just been awarded, after a second ballot, to M. d'Espouy, who this year exhibited a "Restoration of the Basilica of Constantine at Rome," and "Recollections of Greece."—The architect students who have competed for the Grand Prix de Rome have just finished their examinations *en loge*, and their works will be judged on August 23. The award will be made on August 1.—The painter Roghegrosse has just finished the sketch of a rather large composition entitled "La Guerre," which he has been commissioned by the Government to execute for the National Manufactory at Sèvres.—It appears that the Municipal Council of Paris has rejected the project adopted by the military authorities for setting back as far as the Seine that part of the fortification wall which extends between Autouil and St. Ouen. The Council demands the total suppression of the fortifications of Paris, whose defensive works should be taken outside the suburbs.—It is proposed to open at the Palais Bourbon, in April next, the first of a series of annual art exhibitions, the receipts being appropriated to the support of the museums.—On Sunday last was inaugurated the new Mairie of the Eighteenth Arrondissement, of which M. Varcollier is the architect.—There has also been recently inaugurated the new *Salle des Etes* which M. Vandremere was commissioned to erect at the Mairie of the Fifteenth Arrondissement (Vaigrand). This fine hall is to be enriched by a marble bust of the Republic, from the chisel of M. Chaplain, Member of the Institut.—The Académie des Beaux-Arts has awarded a prize of 2,000*l.* to MM. Percheron and Fourmeau, architects, for their "Étude artistique" of the monumental buildings of Khmer, in Siamese Cambodia.—The "Exposition des Arts de la Femme," organised by the Union Centrale des Arts Décoratifs, will be inaugurated on August 1 at the Palace of Industry.—There has just been inaugurated at St. Brevin the monument erected to the Gardes Mobiles of the Oise, who were killed during the war of 1870. The monument is the work of M. Pierre Ogé.—On August 23 there will be inaugurated at Vallerangues (Gard) a statue of General Fériet, executed by the sculptor Morice.—The inauguration of the monument to Le Sage at Vanes (Morbihan) is fixed for September 18 next.—A committee has been formed at Havre for erecting a monument to Admiral Mouchez, recently deceased. He was the Director of the Paris Observatory.—An art exhibition will be held at Fontainebleau from August 1 to September 30 following.—The Lorraine Society of the Friends of the Arts has fixed November 1 as the date of the opening of its twenty-ninth annual exhibition, which will be closed on December 8 following.—There has just been organised at the Champ de Mars, in the Palace of the Liberal Arts, an exhibition entitled the "Summer Salon," which includes a certain number of works already exhibited in this year's *Salon*. The exhibition is one possessing very little interest.—The new General Post Office at Tunis, erected by a French architect, has just been opened.—The Municipal Council of Paris intends to vote a credit of 200,000*fr.* to defray the cost of the participation of various administrative services in the Chicago Exhibition.—On Sunday last the monument erected at Belfort to the memory of Dr. Fréry, Senator for the Haut-Rhin, was inaugurated.—On Sunday last, also, the Labour Exchange at Toulouse was opened.—The City of Paris has just acquired, for the Hôtel de Ville, a very fine portrait of M. Alphonse, by M. Roll, which was exhibited in the Exposition Universelle of 1889.

BERLIN.—According to the *Centralblatt der Bauverwaltung*, a so-called "German House" is to be erected in the grounds of the Chicago World's Fair, the site on which it is to be placed being in close proximity to the English one. The building will contain not only the offices of the Imperial Commissioner and his executive committee, but also a suite of rooms for the convenience of German visitors to the Exhibition. The design shows a building of half-timber construction. The architect according to whose drawings the woodwork is being

out and framed is Herr Radke; the building will, however, be put up under the superintendence of Herr Fiedler, a German resident in Chicago. The usual list of annual reports sent in by the technical *attachés* has been published, and we notice that last year Austria, Italy, Russia, France, and America have been considered as deserving of Government attention. England has again been without an *attaché*, and hence there are no reports on architectural or technical matters from that country. Of the 1,200 reports sent in during the last decade, the majority come from the American representatives. Last year's set of reports contains a very limited number relating to architecture proper; Italy and Russia head the list in regard to numbers.—The system of having technical *attachés* in the different embassies is now to be copied by Austria. The Austrian Government will send out two gentlemen, one to St. Petersburg and one to Washington, the selection of these two cities being due to the difficulties experienced in obtaining such authentic reports of technical importance as can be more easily had from other capitals.—The Emperor intends laying the foundation-stone of the Strasburg Garrison Church in the autumn. This building, which will have seats for 2,100 men, and standing-room for another thousand, is to cost 55,000*l.* The work was put up to competition, Herr L. Müller (Reg.-Bm.) architect, being the successful competitor.—The Special Commission which has been called together to study the causes of the floods in German river valleys, to examine the present system of river regulation adopted in the Empire, and to make recommendations as to the best mode of preventing further catastrophes, has held its first meeting. This very important Commission was elected by command of the Emperor, who took the initiative, believing the present system of river regulation to be based on a wrong principle. The Rhine receiving separate treatment. This Commission will only examine the other rivers; commencing with the Oler, and then taking the Elbe, Vistula, Weser, &c.—The number of students at the Royal Technical College remains about the same as last term, *i.e.*, 1,830. Of 195 non-Germans, no less than ninety are Russians. There are four Englishmen.

LEIPSIG.—The biennial gathering of the Amalgamated Societies of Architects will be held at Leipzig on August 28, and will last three days. It will be preceded by a business meeting of the official delegates of the various societies, and there will be a final excursion to Dresden on September 1, on which day the new *Semper* monument is to be unveiled. The programme is an extensive one, including several interesting lectures, and much sight-seeing and banqueting. Leipzig, which has made such rapid strides in the last decade, can well vie with Hamburg, where the last gathering was held, as far as interesting public buildings are concerned; whilst the business premises, town-houses, and villas will not bear comparison.

MISCELLANEOUS.

APPOINTMENT OF WATERWORKS ENGINEERS.—The Waterworks Committee of the Wolverhampton Corporation have considered 138 applications for the post of waterworks engineer, to undertake part of the duties formerly performed by Mr. Lyons Wright, and the names of three candidates were placed before the Town Council on Wednesday for their final selection. The candidates were—Mr. W. Jones, of the Liverpool Corporation Waterworks; Mr. Thomas Raynes, the senior assistant to the Water Engineer of the Birmingham Waterworks; and Mr. E. A. B. Woodward, of the St. Helens Corporation Waterworks. A vote was taken, and in the result Mr. Woodward was elected. The salary offered is 250*l.* per annum.—We are informed that Mr. H. C. Marks, Assoc.-Inst. C.E., Borough Engineer and Surveyor of Dewsbury, has recently received two additional appointments, accompanied by a substantial increase of salary, *viz.*, that of Water Engineer to the Dewsbury Corporation and Engineer to the Dewsbury and Heckmond-wike Waterworks Board. This latter authority supplies water to the boroughs of Dewsbury, Skipton, and Barnsley, and the local board districts of Heckmondwike, Southill Nether, Ravensthorpe, Skelmanthorpe, and Flockton.

BRISTOL MASTER BUILDERS' ASSOCIATION.—The annual excursion in connection with this association took place on the 19th inst. The locality selected for the visit was Bath and Limply Stoke, and the general arrangements were carried out by the secretary, Mr. H. J. Spear. Luncheon was provided at Limply Stoke, after which the members returned to Bath, where some members of the Bath Master Builders' Association joined the party, and, acting as guides, visits were paid to the Abbey and the Roman Baths. A large company sat down to dinner. The chair was taken by the President, Mr. E. T. Hatherly, and the vice-chairs were filled by Mr. A. Krauss (vice-president) and Mr. G. Humphreys (treasurer). Mr. Galbraith gave "The Architects, Engineers, and Surveyors," which was acknowledged by Messrs. Scoones, Barratt, and Cloutman. Mr. W. H. Brown, in giving "The National Asso-

ciation of Master Builders," said he understood that the work of the National Association was to hear the grievances, and look after, as far as possible, the interests of the master builders in the country, and to keep the various provincial associations in touch one with the other. Mr. A. Krauss, who responded, said there could be no doubt of the excellent general work which the National Association was doing. The National Association, being in communication with all the provincial organisations, was a valuable fountain-head to go to for information regarding general trade matters. He trusted that before long there would be a National Confederation of Builders and Contractors. Mr. Hayward (Bath) proposed "The Bristol Master Builders' Association," which was replied to by Mr. E. T. Hatherly, who remarked that the Association had been doing an excellent work for more than a quarter of a century, and what it had been able to accomplish in the last four or five years was in itself a proof of the necessity of its existence. Other toasts followed. The return to Bristol was safely accomplished.

THE ALBERT PALACE, BATTERSEA.—No bid was made when, on April 27 last, the Palace was put up to auction at the Mart at an upset price of 5,000*l.* We now read that under a distraint for rent, the Office of Works will on the 27th inst. sell all the effects, including the diving bell (formerly in the Polytechnic), the organ, and sundry building materials. The organ was built, from Mr. W. T. Bast's design, by Messrs. Bryceson Bros., and was first set up in the house of Mr. Holmes, by Primrose-hill.

PROPERTIES FOR SALE.—At Dowell's Rooms, Edinburgh, on the 27th inst. Dunmore, Stirlingshire, extending over 4,000 acres, and yielding a net annual revenue of about 6,300*l.* The village, situated on the estate, in Airth parish, lies eight miles south-east from Stirling. Dunmore Castle was an ancient seat of the Murrays, who took thence their title of Earl, conferred upon Lord Charles Murray in 1686. Airth Castle (originally, we believe, a stronghold of Wallace) is illustrated in vol. ii. of Messrs. D. Macgibbon and Thos. Ross's work upon the Castellated and Domestic Architecture of Scotland (1857). Built in presumably the latter half of the sixteenth century, it is remarkable for presenting an example of, together, an open bartizan and its development, the coriactly roofed turret. Each of the two dormers of the east front has a tympanum with enriched moulding and ornament,—the one of lattice and star work, the other of fern foliage. At the Mart, on the 26th inst., Knole Park, Gloucestershire, together with six farms, covering 1,074 acres in all, midway between Thornbury and Bristol, and overlooking the Severn. Knole, in Almondsbury, is an ancient seat of the Chester family; the Almodesbury of the Conqueror's Survey belonged to Berkeley Manor, but in 1148 was given to the Abbey of St. Augustine, Bristol, by Robert Fitzharding, founder thereof. After the dissolution, Henry Darcy sold it, *temp.* Elizabeth, to Thomas Chester. The house stands within some old earth works attributed to Olla, King of Mercia, who, as some say, was buried at Over, in this parish. At the Mart, on the 19th inst., Hares Court, near to Canterbury, with two farms (41*1/2* acres), and in two other lots, Cook's and Young's farms (312 acres jointly). This land belonged in 1080 to Odo, Bishop of Bayeux, at whose disgrace it devolved upon the Crown. It then passed from the Clares, Earls of Gloucester and Hertford, to a family who took its name. Thomas Harries, *obit.* 1556, held it in *capite* by fee of a knight's service, of Tonbridge Castle, a seignory of the Clares. He was with Henry VIII. at the siege of Boulogne; for his good service there the King allowed him to bring away a set of gates from what is now known as the Haute Ville, which in Hasted's time were still preserved in the garden wall, over against the church of Hares Court. And at Exeter, on the 28th and 29th inst., the Haldon Estate, seat of the Palk family, near to Exeter, which is to be offered in eighty lots, producing an aggregate rental estimated at 4,900*l.* per annum, and being nearly 4,130 acres in extent.

ELECTRIC LIGHTING OF THE ST. HELENS TOWN-HALL.—On the 18th inst. the work in connexion with the electric lighting of the St. Helens Town-hall was completed, and the current turned on. There are 339 lights, each one being of 16-candle power. In the engine-house there are two of Bunsen & Chandler's patent double cylinder silent engines, which couple direct to Holmes & Co.'s "Castle" dynamos, each of which produce about 200 lights. The fittings have been put in by Messrs. J. D. F. Andrews & Co., of London, under the superintendence of their electrical engineer, Mr. J. D. Bailie. The cost has been about 1,500*l.*

THE ENGLISH IRON TRADE.—With the close of the general election a staid tone is observable in the English iron market, although transactions are still limited, and prices remain practically unchanged. In crude iron inquiries are a trifle more numerous, and in manufactured iron more business is reported. Tin-plates continue inactive, and in steel little is done outside ship-building material. Ship-builders and engineers are only moderately engaged, and in the coal trade a dull tone is reported.—*Iron.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENT.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Design to be delivered.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENT.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Application to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., vii. Public Appointment, p. xvii.

PROPOSED IMPROVEMENTS, NEWPORT, MONMOUTHSHIRE.—Major-General Crozier, R.E., held an inquiry at the Town-hall, Newport, on the 14th inst., into an application to the Local Government Board on behalf of the Newport Corporation for leave to borrow a sum of 30,000 £ for the improvement of the approach to Newport Bridge.

obtain workmen out of the country, and agents have been sent to Belgium and France for the purpose of obtaining workmen.

MEETINGS.

SATURDAY, JULY 23.

Architectural Association.—Visit to the new Lunatic Asylum erected by the London County Council at Claybury, Essex, by permission of the architect, Mr. G. T. Hine. Meet at Woodford Station, G.E.R., 3.7 p.m.

Sanitary Inspectors' Association.—General Meeting, when a Report upon the recent Visit of the Association to Paris will be presented. 7 p.m.

WEDNESDAY, JULY 27.

Surrey Archaeological Society.—Visit to the Roman remains at Silchester.

FRIDAY, JULY 29.

Institute of Certified Carpenters (Carpenters Hall).—7.30 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

11,102.—WINDOWS.—Sashes: J. Parker.—This patent refers to an improvement consisting in facing the middle or meeting-rails with hard wood in such a manner as to make it almost impossible to break or chip the edges or angles, also effectually preventing burglars opening the sash from the outside without breaking the window.

13,738.—TERRA COTTA: W. Schlemmer.—This invention refers to a process for producing imitation terracotta and ornamental stoneware, which consists in mixing powdered terra-cotta, clay, fire-brick, porcelain, and similar substances with burnt powdered gypsum, burnt alkali lime, and water to form a cement, then pressing or casting such cement into moulds, allowing it to harden, and finally treating the finished articles with barley water.

5,352.—BRICKS: C. Boyer.—This patent relates to the construction of bricks, with special reference to fire-bricks for use in walls for lining metallurgical glass, or boiler furnaces, but may also be applied to bricks for general purposes. The object is to produce a brick that will bind the other side, and a brick may be used to form a bond in any position the brick may be laid.

of the brick and one side of it, and grooves in the opposite side.

8,381.—HOUSE-DRAINS: C. Dehn.—This invention relates to the drainage of houses, and consists in a system which can only be adequately understood by reference to the detailed specification and drawings, by which the inventor claims that not only is the outlet to the main sewer by the cesspool closed by a water-curtain, so that foul gases cannot pass to the house-drain from the sewer or cesspit, but an special arrangement is made to produce a suction up-current in the house-drain and soil-pipes, so that any gases occurring therein are carried off outside the house above the run, instead of being suffered to pass out unassisted with such tendency as their weight or other qualities may give rise to through the ventilating-pipes.

8,795.—ARCHES: G. L. Moeckel.—This invention consists in a novel arrangement of the arches for supporting ceilings and vaults, and the objects are to construct a vault of wide space and small height without the employment of supports, and thus afford a construction of greater cheapness than those in use hitherto. This is obtained by employing arches which intersect at a certain height, and are both continued beyond their lines of intersection without departing from their arched direction and curvature. These arches may be executed in any form desired, the concentric part being that two intersecting arches should be continued beyond the line of intersection without a deviation from the regular course of the arch.

8,157.—WINDOW-SASHES: R. J. Tidwell.—This specification relates to side sashes which have facilities for using weights, and is intended to hang them without weights. The details of the invention can only be understood by reference to the drawings attached to the specification.

NEW APPLICATIONS FOR LETTERS PATENT.

July 5.—12,345, H. Cowell, Sewing Machine.—12,365, J. Hammerley and W. Fowler, Window-sashes.—12,374, A. Bull, Lock for Window-sashes.—12,393, A. Louis, Domestic Fireplaces.

July 5.—12,406, W. Spencer, Hoisting and Ventilating Cords.—12,416, R. Fox, Waste Preventers or Fishing Utensils.—12,445, H. Cutter, Folding Ladders.—12,448, J. von Langer and L. Cooper, Kilns for Burning or Baking Bricks, Porcelain, &c.—12,455, H. Tippett, Nails.

July 6.—12,471, W. Rockliffe and E. Jobling, Door-frames.—12,490, W. Smith, Fireproof Floors.—12,492, C. Parkin, Draught-excluder for Windows.—12,506, J. Bouillon, Tonguing, Grooving, Mortising, Tenoning, and otherwise shaping wood and setting instrument employed in connexion therewith.—12,509, J. Hill and others, Weather-strips for Doors, Casements, Windows, &c.—12,512, J. Salkeld, Fireproof Floors, &c.

July 6.—12,529, H. Bone, Ventilating buildings or structures.—12,574, A. Gerber, Supporting doors, &c.

July 8.—12,583, J. Hayhurst, Spiral Levels.—12,601, A. Sharnam, Brick for building purposes, &c.

July 9.—12,648, W. Munns, Water-closets.—12,650, W. Munns, Flushing Apparatus for Water-closets.—12,675, S. Owen, Nails.—12,676, J. Whitaker, Machines for making Compressed Bricks, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,139, J. Thompson and R. Pollock, Central Elevator or Inletor Ventilators.—10,693, H. Dodd, Window or Door Draught Excluder.—10,582, J. Lafont, Material suitable for Building and Architectural purposes.—10,914, J. Riordan, Door Bells.—11,288, W. Richards, Improved System of Upholstery.—11,732, W. Nathan, Improved Double Windows, Doors.—11,747, J. Bobbie, Fixing Tiles to Walls, Ceilings, and other places.—11,858, T. Dowdle, Window-sashes.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.) 14,913, J. Gay, Tiles and Bricks, and Machinery or Apparatus therefor.—15,509, G. Dolez, Improved

CAPITAL AND LABOUR.

THE LOCK-OUT IN THE BOLTON BUILDING TRADE.—The Bolton building trade lock-out has just been ended, and the men affected resumed work on the 19th inst. The lock-out took place a week before as the result of the plumbers' strike. The Master Builders and Operatives' Federation met on the 18th inst., and it was agreed that from November to January work shall commence on Monday at eight, and at seven on other mornings. The rule as to country money is referred to arbitration, Mr. Rowland Taylor, the Bolton coroner, being appointed umpire.

CARPENTERS' STRIKE AT BELFAST.—The carpenters and joiners of Belfast have gone out on strike for 3d. per hour increase of wages. A special delegates' meeting of the London carpenters and joiners was held on Monday last, when the members of the various societies represented in this country to levy themselves 3d. per week in support of the carpenters and joiners on strike in Belfast, such levy to be continued until the termination of the strike.

THE CARDIFF BUILDING TRADES DISPUTE.—It is reported that the master builders at Cardiff, having failed to get workmen from other parts of the country to come to Cardiff, have resolved to

LONDON.—For painting, &c., at the Infirmary, Mill-end, E.—
 Coste £201
 Wood 778
 Neal 678
 Coleman 373
 Martin 881

LONDON.—For building new waiting-rooms at the Whitechapel Baths—
 Cot £543 0 0
 Cuxhead 985 0 0
 Harper 540 0 0

LONDON.—For the erection of a block of chambers upon the site of 13, 14, 15, Fall Mall, S.W. Messrs. W. S. Joseph & Spink, architects, 45, Finsbury-pavement. Quantities by Messrs. Franklin & Andrews.

Foundation work—
 C. H. & A. Bywaters £1,643
 W. Shephard 1,600

Superstructure—
 C. H. & A. Bywaters £15,900
 W. Shephard 16,178
 Nirk & Randall 15,970
 Levrone & Sons 15,941
 Holland & Hannen 15,748
 Perry & Co. 15,650
 Trollop & Sons 14,948

LONDON.—For new madding-house, &c., Canal-bank, Camberwell, R.R., for Messrs. Stambrook & Co., Limited. Mr. Marshall Hannan, architect, 7, Bedford-row, W.C.—
 Colls & Son £3,890
 S. & W. Pottam 3,884
 Holloway Bros. 3,796
 E. A. Ross 3,793
 M. Patrick & Son 3,749

LONDON.—For alterations at 85 and 84, Christ-street, Poplar, for Mr. Palmer. Mr. Stevens, architect—
 Kings £278
 Chas. A. King 810

LONDON.—For alterations and additions to No. 41, Upper-street, N., for Mr. Huntman. Mr. E. J. Harrison, architect, 70 and 72, Chancery-lane, E.C.—
 Denton £881
 Down 857
 Ward & Lambell 847
 Drew & Colman 846

LONDON.—For additions and alterations to 15, Davage-place, Bayswater, W. Mr. F. A. Bruns, architect, Richmond, W.—
 D. Charlton £1,458 0 0
 J. Timson & Sons 1,113 0 0
 Holloway Bros. 1,221 0 0
 H. Wilkinson 1,410 0 0

LONDON.—For rebuilding No. 542, Holloway-road, with addition in rear, for Mr. A. Monk. Mr. George Carter, architect, 113, Holloway-road—

	Home.	Addition.
Austin	£2,040	400
Gaselman	2,516	—
Hose	2,003	716
Hughes	2,222	854
R. D. Lewis & Sons	1,749	650
Stevens Bros.	1,759	846
Lake Morris	1,743	631
Parfitt	1,763	490
Alton	1,469	400

LONDON.—Accepted for alterations to shop premises, in Strand Green-road, N., for Mr. H. Pookan. Mr. R. Hildeworth, architect—
 N. Lidstone £497 0 0

NEWMARKET.—For erecting new trading establishment at Exning, near Newmarket, for Captain E. W. Bond. Mr. Jas. Finlayson, architect, Newmarket—
 Kerridge & Shaw £6,877
 Hunt & Blyth 6,550

NEWMARKET.—For erecting new cottages at Newmarket, for Mr. Gilbert. Mr. Geo. Finlayson, architect, Newmarket—
 Hook & Tibbitt £2,830
 Cowell 1,898
 King 1,785
 Simpson & Son 1,799

NEWPORT (Mon.).—For the erection of grain warehouse, River-side, Newport, Mon., for Messrs. Parnell, Evans, & Co., Limited. Mr. W. H. Wadling, architect, Council Chambers, Newport, Mon., and Cardiff. Quantities by Mr. J. D. Whitaker, Newport, Mon.—
 War, Price £2,140
 Charles Lock 2,400
 John Luton 2,287

Iron Roof and Columns and Girders for Above.

	Roof.	Columns and Girders.	Total.
Baker & Co.	£278	430	£708
St. Paulina Iron Company	—	445	—
Iron Foundry	500	297	797
Finch & Co.	48	212	260
Rewston, Braw, & Co.	282	142	424
Morton & Co.	319	278	597
W. Parfitt, Bhow Vale (accepted)	373	523	896

PONTEFRIDG.—For building police station, Pontefrith, for the Shearwater County Council. Mr. A. T. Davis, C.E., County Surveyor. Quantities supplied—
 M. Williams £1,906
 W. Reynolds 374 0 0
 H. Price 1,811 15 0
 R. Price 1,627 0 0
 W. Swala 1,615 10 0
 T. Francis 1,560 0 0

PONTEFRIDG.—For the erection of a house at Cliff-top, for Mr. Arthur O. Evans, architect, Pontefrith. No quantities—
 Ed. Owen & Co. 995
 J. John Williams 850 0 0

RASTRIK.—For sewing, paving, &c., of Draxton-street, for the Local Board. Mr. Chas. E. Shackleton, Surveyor. Quantities by Messrs. G. & G. H. Crowther, Newcastle, Ruideschild—
 Joseph Wright £1,000
 Thos. B. Dyson 1,638 14 3
 Frank Crowther 1,652 0 0
 Sam Hall 1,647 0 0
 David Barry 1,633 18 2
 Alfred Yates 1,525 0 0

ST. LEONARDS-ON-SEA.—For alterations and improvements to bathing precinct, St. Leonards, for Lloyd's Bank, Limited. Mr. Arthur Williams, architect, Hastings—
 T. Silber £295 17 0
 J. Jenkins 988 0 0
 H. Crutchedge 888 0 0

TOTTENHAM.—Accepted for the construction of a 2 ft. 6 in. by 11 ft. 8 in. brick sewer in St. Anne's-road, Tottenham, for the Board of Health. Mr. J. E. Worth, C.E., Engineer—
 H. Crutchedge & Co., 25, Queen Victoria-street, E.C. £2,004 18 0

WHITCHURCH (Salop).—For the erection of six shops at Whitchurch, Salop, for the Misses Kell. Mr. Reginald A. Riz, architect, 11, Doughty-hill, London, E.C.—
 Smith & Sons £4,450
 Dodd 3,067

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 Walnut Dadoes " 1s. 11d. "
 Oak " " 1s. 11d. "
 Oak 1 inch Parquet Floors, laid and polished, at £7. 10s. a square.
 Solid 1-inch Oak, straight boards, laid and polished, at £8. 18s. a square.
 Solid 2-inch Oak Parquet for covering Deal floors, laid and polished, from 2s. a square.
 Oak Wood Tapering Dadoes, from 1s. per foot square.
 Walnut or Mahogany, from 1s. 3d. per foot square.
 Ditto, ditto, with Carved or Painted Panels, prices according to sketches.

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"Associate, R.H.A." (We cannot believe that the anonymous and insulting postcard emanates from the quarter indicated. All the members of the body referred to are, we hope and believe, gentlemen utterly incapable of the cowardice of sending anonymous insults or postcards.—W. P. (two issues).—W. H. W. (two of your items were too small for insertion).—G. L. S.—J. H. B. (we do not insert letters which are sent to other journals).—A. V. Co. (we do not insert tenders without amount).—T. E. M. (see the Post Office London Directory: there are several companies of the kind you address.)
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Vol. LXIII. No. 252.

June 30, 1891.

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Architectural Notes in San Francisco.



STUDENT of architecture who should roam as far as the Pacific coast of the United States, and wander up and down the steep grades of San Francisco streets, would find varied and unexpected entertainment; as varied in regard to architectural style as if the city were as many centuries as it is years old, and had felt the influences that have made Europe an architectural museum. Not that the architecture of San Francisco is a reproduction of anything that ever existed; but it is a reminder of everything that ever existed, and withal there is a nonchalant disregard of the inevitable expression inherent in material. If the architecture of San Francisco were simply the result of ill-considered attempts to provide temporary accommodation at the least expense, like that of so many Western towns, the whole question could be disposed of in a few words, with the assurance that permanent conditions and accumulated wealth must sooner or later be accompanied by the usual manifestations. But as the architecture of San Francisco, however ill-considered, is not an attempt to provide temporary accommodation, and is not markedly economical,—often markedly extravagant,—its peculiarities are not to be accounted for by pioneer conditions, or by lack of means.

The State of California is very rich in quarry beds of granite, sandstones, and marbles; and while these materials have been exported in large quantities, the prevailing dread of seismic disturbances has prevented the general employment of other materials than wood in San Francisco and the other large towns. There are instances of brick buildings in the older and more level parts of the city, and instances of buildings constructed mainly of concrete, but the number of such buildings is not sufficient to disqualify the assertion that San Francisco is a wooden city by fear, not from choice.

The climate of San Francisco is mild and

foggy, with no great variations of temperature, so that an ordinary frame-building on a light foundation is practically sufficient for any purpose. When these conditions are understood much that seemed arbitrary and absurd is seen to have a rational origin: though the superabundance of moulding, carving, and turning that has no individual or relative value remains wearisome enough, and does not alleviate a general effect of monotony. There is probably no city in the world where so many bay windows are to be seen, destroying all sense of architectural repose in every direction; and as there is nothing to be seen by looking out of them but similar excrescences, they must be born of the irresistible desire to get something for nothing under the provisions of the city ordinances, which permit an encroachment beyond the building line of 3 ft. for the purpose of a bay window, "provided said bay shall not be more than 9 ft. in width nor within 6 ft. of any other bay window, and provided said bay shall not be more than three stories in height, nor less than 13 ft. above the side walk to the under side or soffit." In streets of very steep grade, with as many bay windows on each side as the letter of the law allows, and every one beginning and terminating on a different level, the effect is very disquieting; and this effect is only enhanced by the variety of conceits in the shape of turrets, belvederes, crenelated and tessellated towers, Moresque domes, and Oriental pagodas, that crown these circular, square, hexagonal, octagonal or elliptical bays. The difference between a modest dwelling and a "palatial residence" is mainly one of size, and of the quantity of ornamentation made to adhere to the exterior; and confined to the street front at that, for beyond the mere necessities of decent living, we shall find every additional penny of expenditure flaunted on the outer walls. There are a number of very large and very expensive houses in San Francisco on which every luxury obtainable for money is lavished; but these extravagant indulgences are in the worst possible architectural taste,—with one or two exceptions, and these are not models of excellence.

The fear that built San Francisco of wood has within the past few years been supplanted

by a new dread of fire; and the rebuilding of the business district of the city has been fairly begun with brick and terra-cotta, granite, iron, and steel; in two instances already towering to eleven stories in height, in defiance of earthquakes. The "fire limits," as the boundaries of the district are called, within which no wooden structure can be erected, are steadily expanding in spite of strenuous opposition from property-owners, and perhaps twenty years hence San Francisco may lose, or rather outgrow, much of her architectural eccentricity. For unless those bay windows, which are as constantly a feature of commercial as of domestic buildings, are to be constructed of iron or steel, their excessive cost must necessarily abate them. There is already an alarming array of galvanised sheet-iron protuberances, painted and sanded to match, accompanying sandstone or terra-cotta, but as these are mere casings of wooden frames they are very little less dangerous in fire than wood construction entire, and the underwriters will probably take measures to ablish them. The underwriters have awakened to the fact that it is quite unnecessary that the United States should sacrifice more than 50,000,000L. per annum in fires that could be avoided by spending 25 per cent. of the amount in improved construction; to say nothing of the saving such simple precautions would effect in the running expenses of the fire departments. San Francisco has had several very narrow escapes from destruction by fire, and as the wind may not die, or very obligingly shift, or a heavy rain-storm come up next time, there is a general disposition not to rely altogether on the non-combustible character of the Redwood timber, which has undoubtedly been the main reliance. Even the enforced "decoration of construction" by the adoption of permanent material, instead of "constructing decoration" out of all sorts of flimsy makeshifts, cannot well bring about very important architectural results in San Francisco in less than twenty years, because the purse-strings are held by men who are for the most part without education, while, as a natural consequence, or at least a natural accompaniment, professional standards are very low. Architecture is a mere business, in which any person engages

who thinks he can control enough influence to make it pay. Draughtsmen are always to be had with more or less experience; and so, between them and the contractors, something is determined on that the owner will accept. What with constant open competition, constant personal solicitation, throat-cutting in commissions, and unscrupulous favoritism, with its concomitant spoils, architecture fares as it can. We would not be understood to assert that there are no true architects in San Francisco, for we are acquainted with several, but their experiences would discourage the stoutest heart, and render futile the most thorough professional equipment. It is unfortunate that the education and experience that enables a man to make money should generally unfit him for spending it, and, therefore, we must look to the next generation of property owners in these parts for a better state of things, as they will inherit fortunes they have not soiled their hands in accumulating, and may acquire a taste for something else; at least, they may learn to treat with respect "the elder, or fairer, sister of Science, whom we love all the more that her usefulness cannot be demonstrated in dollars and cents."

If it is true, as Mr. Lowell says, that a nation has a right to be judged by its best, it should be true of a city; and we would have it understood that in selecting a few San Francisco buildings for comment, we are actuated by the desire to make the best possible showing. We have also selected such as are fairly representative of existing activity, because in no other way can the San Francisco we must reckon with be appreciated. The city has passed through many phases in her short and eventful life, but she is probably now safe from any atavistic tendency, and must ultimately become the second city in the United States. Therefore, structures that no one would think of erecting now, and which must sooner or later be demolished, have no representative interest in this connexion.

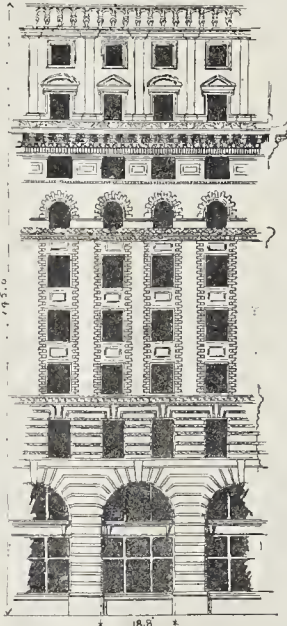
Of Government buildings we fear we can say nothing, for, although the City Hall is still incomplete, it is now past hope; although originally a generous scheme, now only a monument to incapacity and political jobbery on a large scale. Such other courthouses, police buildings, and fire department buildings as there are, both old and new, lower rather than raise the standard suggested by the City Hall. From the large hotels we shall derive very little encouragement, unless we go in to look at the most recent interior fittings and decorations, much of which are excellent in design and execution, and must set the standard in such matters for a long time to come. The theatres, as is usual in America, are not buildings for the purpose, but mere entrances through a hotel building to an auditorium, where the achievement is seldom so much an architectural one as a matter of colour, decoration, upholstery, and modelling in plaster; and there is nothing in San Francisco of this kind that is either better or much worse than we are accustomed to elsewhere. Of banks and corporation edifices there are, as yet, but three completed instances in the way of modern improvements: the *San Francisco Chronicle* building, the home of the largest daily paper; the First National Bank building, and the Crocker Wolworth National Bank building. Of these the Crocker building is the largest, the tallest, the most expensive, and, on the whole, the most successful architecturally. The first two stories are included in a granite arcade of rusticated channel work, very similar in design to the *porte cochères* of more than one Florentine palace, but the dignity of the treatment, so dependent on the massiveness of the piers, is sacrificed to the inexorable demands for light; and the actual mass of material is reduced to the engineer's margin of safety; resulting not only in an apparent effect of weakness, but exaggerating the span of the arches to a sprawling expression destructive of repose. Upon this inadequate base is imposed a structure of ten more stories in buff brick and buff terra-cotta;

and, in spite of a good deal of bold modelling, an effect of flatness and meanness has not been avoided. The fact is that the mere repetition of details that are in themselves ill-assimilated copies of stone



"Chronicle" Building, San Francisco.

examples from much smaller and very different structures must prove a very imperfect solution of the difficulties arising in such conditions. The shape of the lot is a



Part Elevation of Crocker Wolworth National Bank Building, San Francisco. (Total length of two street fronts, 329 ft.)

triangle, resulting from the intersection of two streets at an acute angle, and no more effective treatment seems to have been suggested than the rounding of the angle and the reduplication of one arch, with the

windows and cornices above, for the length of the resulting street fronts; with such contractions, sillings, and omissions as become inevitable on approaching that acute angle from either direction. To mitigate the effect of compromise to some extent, the entrances have been emphasised by engaged shafts of very pronounced entasis, and though the columns are decidedly Tuscan, the caps are very perfect reproductions of the Ionic capitals of the Erechtheum in white marble! The volutes, with all their delicate chiseling, are nevertheless chipped and chopped off where necessary to stop against the granite.

These buildings are, of course, only partly occupied by the Corporations in whose names they are erected, being mainly devoted to offices that are rented for all the usual purposes, so that the new Mills building, not yet completed, which is an office building, may properly be ranked with them. This building is sufficiently near completion to display its real character, which is, allowing for the advantage of a square corner site, the most dignified design yet attempted in San Francisco. Whatever one might find to criticise if desirous of being very nice, it is nevertheless a whole, a pile with its essential parts and its culminations,—in fact, an architectural thing with a skeleton, a constitution, and a manner. There are things, and have been many, that show higher breeding, and are the results of much more cultivation than this building shows; but we must not ask too much. This is, at all events, not a lout or a clown dressed in its hettlers' clothes. San Francisco is still very far from "that good taste which is the conscience of the mind" in architecture, but we begin to believe it may yet be awakened when we see generous spaces of wall left without enrichments, together with simple aspiring lines uninterrupted, in a building whose treatment in other respects assures us that parsimony has played no part in determining the questions involved. Speaking of simplicity and dignity, it is to be regretted that the United States Mint building, already nearly thirty years old, could not have been erected on a more prominent site, where it could have confronted the city denizens on their daily rounds; for while of its type there are many better things in various places, there are none here; and there is a repose and refinement about such things that it is well to be familiar with. A young architect is enticed by the fashions and the whims that arise from time to time, but he returns to his order with that sense of reliance and appreciation which comes with maturity.

There is as yet nothing ecclesiastic in San Francisco that can properly be cited as either representative, permanent, or good. It is not a city of churches, though of the old Spanish occupancy there still remain some very picturesque reminders in the outlying districts; but their influence has not proved strong enough to prevent the erection of hideous contrivances side by side, with just enough conventional character to show the intention of building something that must pass for a church, whether in brick, stucco, or wood. The new Roman Catholic Cathedral can hardly be cited as an instance of ecclesiastic architecture, as no one would suspect its having been intended for anything more serious than a masonic hall or institution of some sort, and it should be said that the local pride has not felt flattered in the acquisition. The libraries have done very little in architecture to emphasise their importance, only one having as yet been provided with its permanent home, and in that instance there seems very little opportunity to draw any conclusions of interest. A square two-story yellow-brick building of Italian design; a mere repetition of round-headed windows, one of which, carried down, serves as a doorway, with meagre tablets on either impost setting forth the necessary information; some scanty enrichment in bead and shuttle ornament; a very diffident cornice above, inadequately supported on infrequent modillions all in terra-cotta,

and our description is exhausted. Before many years more are gone, probably a good deal will be done in providing the different Clubs with suitable habitations, as at least half-a-dozen have already acquired property for building. The Clubs are now either perched above shops, or occupying makeshift quarters adapted from some dwelling-house. The German Club has recently completed an ambitious pile that is somewhat difficult to describe, being a sort of compromise between a Romanesque basilica, a fourteenth century French chateau, and a Turkish mosque; but the strong yellow sandstone, with flaming red brick, the very slight recession of the multifarious windows, and a concealed air of "look at me, now that I am finished!" give it a character all its own.

Such things, of which this club-house is only one instance, incline one to the belief that the essential education in architecture is as to the nature and capabilities of materials, both as a matter of construction and resultant expression. To see stone, terracotta, wood, and metal used indifferently throughout the same building, as if it were of no consequence which is used, so that a certain arbitrary form is realised, which form, as might be expected, is often senseless and absurdly suggestive of something entirely different and irrelevant, is the most discouraging manifestation of modern ingenuity.

Few stronger illustrations of the importance of material in the execution of a design can be given than that afforded by the Colton residences here,—a simple, elegant mansion, perhaps a little more Italian than Inigo Jones ever built, but still of that type,—a design that, if executed in marble, could have been eminently satisfactory, but the meanness of boarding and white paint is not to be overcome. The whole thing becomes a cheap scenic representation,—a sham and a disappointment,—in spite of good proportion and excellent detail. The house is not new, having been built some twenty years ago, when half-a-dozen railroad millionaires simultaneously erected big houses in the locality, since known as "Nob-hill." These big houses are of various designs, and none, with the exception of this Colton house, worth a moment's consideration; though in them have, by this time, been gathered many important works of art, together with much expensive rubbish. Now and then, with the object of raising money for some charitable purpose, the private collections of San Franciscans are exhibited, and it is encouraging to know that there is a constantly increasing number of good pictures and other beautiful things that have come to stay, and must exert a constant influence, attracting more, till some day it may not seem unmanly to be sensitive and discriminating.



Angle of Town Residence, San Francisco. (First story, brick; second, wood; porch, marble.)

NOTES.

It seems rather singular that at the annual demonstration of the Durham miners, which took place last Saturday, not a word was said on the eight hours' question. Many kindred subjects were dealt with in the resolutions submitted from the various platforms, but this particular one,—which we should have supposed to be peculiarly a miners' question,—was conspicuous by its absence. In the neighbouring county of Northumberland it has just been very prominent in connexion with another wages dispute which has arisen in the engineering and shipbuilding trades. At Newcastle last week the men's representatives met a proposed reduction in wages with an offer to accept a reduction of 2½ per cent. "on condition that the employer granted an eight hours' working day, or forty-eight hours per week." This being refused, they subsequently offered to accept a 5 per cent. reduction,—still subject to the same condition; but no settlement could be arrived at on this basis. Many of those most directly affected by this question are disinclined to look upon it as one to be settled by legislation,—especially in the North,—and this may account for the Durham miners omitting it from their programme. In passing a resolution with respect to the recent strike, the hope was expressed that, in this future, "some more reasonable, more peaceful, and less expensive mode of settlement will be resorted to." Mr. J. H. Wilson, M.P., told them that the only way to avoid strikes was by a solid combination of all unionists. The idea of thus being in a position to dictate at pleasure both to employers and to other trades may commend itself to union officials, as pointing to a one-sided settlement of all disputes; but, in the absence of moderate and reasonable counsels, strikes will never be abolished, as they seem to anticipate, simply by the formation of a gigantic federation.

Who are the persons to blame for the railway disaster near Melton Mowbray is a point which has yet to be cleared up at the inquest and the Board of Trade inquiry into the matter, but the mere perusal of the facts as reported in the daily papers shows that this was one of that class of railway butcheries which it is a mere misuse of language to call "accidents." It is a disaster the contemplation of which is rendered doubly painful by the reflection that it need never have happened at all. Either the rails were left in a state dangerous for any but slow and cautious traffic, without due information being given to the driver, or the latter must have neglected the intimation and proceeded without proper caution. At present there is no evidence forthcoming to show where the blame lay. The probabilities are in favour of the engine-driver, who in such a case carries his own life in his hand as well as the lives of the passengers, and who is likely to have both more observation and a higher feeling of responsibility than is to be found among a gang of platelayers who can only endanger other people's lives and not their own. But whichever way the negligence lies, we have no doubt that this so-called "accident" is the result of culpable negligence on the part of some one, and we hope the blame will be brought home to the right quarter. There are railway disasters which really belong to the chapter of accidents, but this was not one of them.

MAJOR FLOWER, the Sanitary Engineer to the Lea Conservancy, has addressed a circular letter to the sanitary authorities in the Lea watershed, pointing out to them the importance, in view of the possible or probable importation of Asiatic cholera, of preventing any pollution of the water supply, and asking to be informed of any contamination which may come under their notice. Major Flower requests the sanitary authorities also to see to the abatement of nuisances,

such as offensive manure-heaps, overflows from cesspools, privies, &c., which may contribute to the fouling of the river Lea and its tributaries. It is to be hoped this timely warning and advice will receive due attention.

NO one who read the account of the burning of St. John's could have any doubt as to the cause of the disaster: timber architecture, a dry hot wind, absence of water owing to some work being done on the water communication, and the sudden and apparently accidental breaking out of a fire under these untoward conditions. But the question it is not so easy to answer is,—why has St. John's been burned twice within fifty years? The conflagration of a whole town is not a common occurrence; that it should have happened twice to one city in less than half a century shows that something is radically wrong in the manner of building or in the provision for fire-extinguishing, or both; and before St. John's is rebuilt the local authorities had better set themselves to find out what has been wrong in the past, and avoid it in the future.

A CORRESPONDENT in Rome writes that some fragments of a great wall, constructed of peperino stone, were lately come upon in the course of excavations for a road on the slope of Monte Gentile, near Ariccia. The wall was 1.25 metres thick, and at the distance of 9 metres from this wall another was found nearly 2½ metres thick of similar blocks. Between the walls was an artificial platform of tufa rock; the whole as shown in the accompanying section.



Some hasty excavations made in other parts of the hill brought to light several fragments of the same wall, apparently an ancient fortification of an Etruscan city. From the same correspondent we learn that at a spot called Quarto de Montebello, outside the Porto del Popolo, Signor Piacentini has found some ancient chambers, probably of the *therme*, in which are some mosaic floors of interesting character and in fair preservation. The remains of the masonry appear to belong to the second century A.D. with some traces of later work. The mosaics include one formed with square tesserae of white, black and red marble, arranged in a geometrical pattern imitating a mat; a second somewhat similar one with large octagons at the angles; a third with black ornaments on a white ground and some figures of winged genii and birds; one or two others with simple geometrical patterns, another ornamented with flowers and birds, and lastly one with a somewhat elaborate centre-piece representing a sacrifice, and formed with tesserae of brilliant colours,—ruby, emerald, turquoise, &c. Terra-cotta pipes, forming a portion of the apparatus of a hypocaust, were found on the site.

AS the suburbs of Vienna are now to form officially a portion of the city, of the "Gros Wien" of the future, there seems to be a laudable desire on the part of the city authorities to carry out improvements on a definite system, and to plan out all the future street improvements before taking the work in hand, so that every improvement may be part of a scheme considered and settled beforehand. This is what ought to have been done long ago in London. The Vienna authorities also propose to take in hand the regulation of the Danube Canal and of the river Wien which passes through the capital, and to extend the drainage system. They have opened an International Competition for obtaining proposals for their schemes as a whole, or for parts of it, and offered a number

of premiums and a very well-defined programme of requirements. The competition will not be decided till about a year from now. Whilst Vienna is engaged on these extensive schemes of improvement it would be well if immediate attention were given to some more everyday matters, such as the uncleansed roadways and the smells that arise from the sewer grids. The boulevards with their imposing architectural monuments give the casual visitor a favourable impression of Vienna; if he enter the city proper or the suburbs he will see a very different picture, and on inquiry he will find that the contrast is due to Government control on one side and municipal management on the other. The Municipal Board of Works of Vienna is an enlightened and active body; it is the "Common Council" (a body notorious for its political and personal factiousness) which stands in the way of improvements.

THE result of the proposal for a new cathedral at Berlin will be, it seems, a systematic inquiry into the acoustic qualities of about 200 churches in Germany. Professor Raschdorff's design for the cathedral has been criticised as impracticable for actual use as a church, and he has apparently set on foot this investigation into the acoustic qualities of existing churches by way of obtaining practical material for rebutting the criticism. Professor Helmholtz has been invited, among others, to give a scientific opinion on the subject.

A SUGGESTION was made by Mr. Slater, in a letter to the *Times* of Monday, that the site of Her Majesty's Theatre would be an admirable one for the erection of a new "Palais des Beaux-Arts" in which the Royal Academy could be better housed and have more space for its exhibitions than at present, and Burlington House could be given over to the scientific societies, which are clamorous for more room. The idea is one which would have been well worth consideration if made earlier—which is well worth consideration now, in fact; but we fear it comes too late. If the site has been taken up for a hotel speculation, it will never be got hold of for anything better now. It is a thousand pities that it should be so, but hotel building seems to be a kind of craze at present, though it is difficult to understand how all these monster hotels can pay; and architecturally the result is always the same, viz., a mass of building with the most commonplace details put together without anything that can be called design, and buried up by night and day labour in order to get the earliest possible return for the outlay. The site of Her Majesty's Theatre might certainly have been turned to a better purpose than that.

IT is proposed to commemorate the hundredth anniversary of Shelley's birth by the establishment of a "Shelley Library and Museum" at Horsham, from which Field-place, where he was born, is two miles distant. In his "Life" of the poet (1886) Professor Dowden describes the house where he was at school under Dr. Greenlaw, during the interval 1802-5. That house is still standing—at least, was standing eighteen months ago—under the name of "Syon Park House," about midway between Isleworth and Brentford railway-stations, but shorn of the school-room which lay against the front of the house, abutting on the road. Here Captain Medwin, another biographer (1847), was Shelley's school-fellow. He married Mary Godwin, in St. Mildred's, Bread-street (as we read in Mr. Hutton's "Literary Landmarks of London"), a church which seems to have been frequently chosen for weddings in respect of which publicity was not sought. At that time Mary Godwin lived in the Polygon, Somers Town, recently pulled down, and her husband had lodgings at, we believe, No. 23, Chapel-street, leading from South Audley-street to Park-lane, re-named Aldford-street four years ago. The monument ex-

hibited this year by Mr. E. Onslow Ford, A.R.A., at the Royal Academy, is presented to University College, Oxford, by Lady Shelley, widow of the poet's son.

A PROPOS to another centenary about to be celebrated,—that of the discovery of the New World,—it may not be amiss to mention here that Bartholomew, brother of Christopher Columbus, was a map-maker in London, in 1489-90; and that Ferdinand, son and biographer of the great admiral, came, as we are told, to England for Charles V., and his catalogue of books, maps, and plans, bought by him during his travels, has been preserved in the cathedral library of Seville, to which he bequeathed his own large collection. An entry in the list records his purchase of a map of London, engraved on copper, and dated 1497. That a copy of the map will be forthcoming can scarcely be expected now: so far, the earliest known view of London, as a whole, is the drawing by Van den Wyngaerde, the Dutchman, bequeathed by Mrs. Sutherland to the Bodleian. It is undated; but some other drawings by him of various buildings in and around the town are signed, and dated 1558. The view has been copied (and engraved) on a smaller scale by Whitlock, who however introduced details unwarranted by the original; and its re-production formed the first publication of what seems now to be the defunct Topographical Society of London.

THE Commissioners of Woods and Forests have just cleared a building-site of about 8,900 ft. superficial by demolishing Lane's Hotel with other property in Norris-street and St. Alban's place (behind the Hay-market, western side, where formerly stood St. James's-market. One entire block of the market yet remains; a portion was removed for Nash's improvements under the Act 53 Geo. III, c. 120. Henry Jernyn, Earl of St. Alban's, built it in 1666, as we learn from Pepys's diary, April 1 of that year. It formed the chief market for meat and poultry for the west of London when Swift had lodgings (1710) in St. Alban's-street, now represented by Carlton-street, leading into St. Alban's place, marked by the Tuscan colonnade. Market-street leads southwards out of Jernyn-street. St. James's fair, which appears to have enjoyed a reputation no less notorious than that of May fair itself, was removed to the market-place from the vicinity of St. James's Palace in 1665. At the St. Alban's tavern, by the market, was founded the Roxburgh club, by T. F. Dibdin, after the sale of the Duke's collection at 11 (now 13), St. James's-square, in May and June, 1812.

THE exhibition of student work in connexion with the National Competition of Schools of Arts has been held this week at the South Kensington Museum. The collection of drawings of various kinds is a large one, and a great many are of high average in merit. Amongst the architectural drawings are designs for a church by James H. Tonge, wrought-iron gates and grille by Herbert S. Pepper (who also sends two examples of signs to be executed in iron and copper), and a newel and balustrade by Benjamin J. Fletcher. Two sets of measured drawings of the old window forming the front of Paul Pindar's house in Bishopsgate-street, now pulled down and set up in the Museum, are carefully finished in outline, with the shadows given in wash, and Alfred Palmer sends a good set of measured drawings of a late pulpit at St. Elizabeth's Church, Scarisbrick, Lancashire. Amongst others are the font in Winchester Cathedral (Ernest W. Light); north door, S. Maclou, Rouen (Benjamin J. Fletcher); wood screen, Warfield, Berks (W. H. J. Allen); and some careful drawings of old crosses and chapels in the Isle of Man, which should be interesting to archaeologists. The number of drawings of Decorative work of various kinds is very large, designs for textile mosaics, tiles, and wall-papers forming

a long series. A design for silk and gold (Miss Mobun), for tiles (Miss Robb), for damask (Miss Caldwell), and mosaic (Miss Boots), the latter a very good piece of design and drawing, are some of the best that we noticed. There are besides a large number of drawings of flowers and still life, and the usual examples taken from the antique.

THE *Edinburgh Review* for July contains an article on "Formal and Landscape Gardening," being a review of books by Mr. Milner, Mr. Blomfield, and the late Mr. Sedding. The subject is treated from the architect's not from the gardener's point of view. The reviewer, while sympathising with the revived taste for the formal garden, deprecates anything like a mere archaeological revival, concluding with the observation that "if the revival of formal gardening is undertaken merely as a fashion, the arbitrary adoption of the taste of a former period, it can have no other fate than has attended the revival of Gothic architecture,—to be pursued until all the copying has been done that could be done, and then to be abandoned in favour of another fashion, leaving only a collection of sham eighteenth-century gardens as its record." The *Edinburgh* is severe in its criticisms of the tricks of effect of the landscaper-gardener.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

AT its later sittings the Commission has entered upon a new field of inquiry,—the claims of the communities in the valleys of the Thames, the Lea, and the Colne to retain their local water supplies for their own increasing populations. The Chairman, however, has been very careful not to overstep the limits of the reference to the Commission, and has declined to allow statements to be printed which went beyond those limits in suggesting that water authorities should be created for certain areas. Buckinghamshire, Surrey, Essex, Middlesex, and Hertfordshire have been heard by their representatives in assertion of their claims to what they regard as their own water. The Conservancies of the Thames and the Lea have been heard again in reference to the alleged pollution of those rivers, and have given the results of their own independent examinations with the object of modifying the conclusions to be drawn from the reports of Drs. Ashby, Fosbrooke, and Turner made on behalf of the London County Council.

On the question of storage by reservoirs in the river valleys—its geological possibility, utility, and expediency—there is some engineering as well as medical and chemical evidence; but the subject has only been mentioned incidentally, being reserved as part of the question of future supply.

We continue our summary of the statement made by Dr. Frankland, the Water Examiner:—The pollution of the Lea and its tributaries is similar in character to that of the Thames, but considerably less intense. The intake of the New River Company is 22 miles above that of the East London Company, and between the two intakes the river receives a good deal of polluting matter, including the treated sewage of Hertford. When the Lea is not in flood, the water at the New River intake differs little chemically from the spring and deep well water obtained from the chalk; but microbes are much more numerous than in spring water. The New River Company, therefore, often delivers water scarcely inferior chemically to spring water. At the intake the water taken for examination has always been turbid, but, efficiently filtered, it has been delivered apparently free from suspended matter, but showing optically an enormous number of suspended particles. Analyses of 1891 of water at the intake show an improvement of 60 per cent., and 32 per cent. over one sample taken in mid-winter in 1873. In six weeks microbes varied from 71,865 to 226,484, and averaged 134,956 per cubic inch. Owing to insufficient storage, the company is compelled to deliver flood water, and samples taken in February and March, 1891, contained thrice the

* See last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 23, 47, 71.

usual amount of organic matter. In six weeks ending April 17, the improvement averaged 20 per cent. The water delivered, although variable, is on the average superior to that of any other company drawing from rivers. The open conduit bringing the water,—river, spring, and deep well,—to London, originally forty miles in length, has been shortened by various cuts. It is protected from polluting streams, but in many places cattle have free access to the banks. In several places the conduit freely communicates with ornamental waters in the grounds of private residences; it passes through villages, parks, and gardens, and sometimes skirts high roads. "I have never" (the witness said) "seen elsewhere water for dietetic purposes conveyed through cultivated and inhabited districts in such a manner. This open conduit should be replaced by 'cut and cover,' or iron mains such as are used everywhere else for this purpose." By the time the East London intake is reached, the sewage effluent of Hertford and other places raises the organic impurity by an average of 141 per cent., and the microbes by 40 per cent., the numbers varying from 337,364 to 53,103, and averaging 189,403 per cubic inch. In respect of microbes this is considerably better than the Thames at Hampton. The waters improved 40 per cent. in respect of lifeless organic impurity, and 98.3 per cent. in respect of living impurity. In the water delivered the microbes varied from 7,216 to 1,246, and averaged 3,165 per cubic inch. The storage capacity equals 14½ days' consumption,—more than that of any other company except the Chelsea. The defects in the Lea supply are essentially the same as those of the Thames, and therefore it was not a suitable source for drinking water, but its abandonment is not so urgently required, as its pollution is less. The hardness of the water is slightly greater than that of the Thames.

In a long examination, Dr. Frankland said that our present knowledge of micro-organisms was incomplete and contradictory, and investigations were in progress, the results of which it was hoped would be communicated to the Commission at a later date, whilst another year was likely to produce much detailed information from many observers. It was a recent discovery that filtration would remove 98 per cent. of micro-organisms, and if he had had our present knowledge in 1874 the terms of the Report of the Rivers Pollution Commission would have been less severe. He had been astonished to get only from 4 to 24 microbes germs instead of hundreds in a cubic centimetre of water; but still this was only one of a series of experiments that were to be continued for months. A single germ passing through a filter might multiply into millions, but in four germs you were not likely to have a pathogenic germ. He had not attempted to distinguish between pathogenic and harmless germs, because even Dr. Klein had failed to find any pathogenic germs in London water. There was probably no instance of a river water that had been stored and filtered communicating disease, but cholera poison, put into the Don at Sheffield, had been carried to Doncaster. Practically, typhoid and cholera are the only two diseases that had been proved to be communicable by water, and cholera bacillus was soon destroyed by competing microbes; but if there were cholera in the upper reaches of the Thames, it would be unwise to drink Thames water. The Tame was so badly polluted that it was found in actual putrefaction, and, therefore, there would be a strong probability that in the Tame the cholera bacillus would be destroyed by other microbes; in other words, as a Commissioner remarked, the worse the river the less danger of disease. Then, the greater the dilution the less the risk of typhoid fever. A Commissioner calculated that in the valley of the Lea there would be one case of typhoid in a body of water that would measure three miles in length, two miles in width, and 6 ft. in depth; and in that case the witness admitted that the risk would be reduced to zero.

Mr. W. J. Dibdin, Chemist to the London County Council, submitted the results of many analyses and microscopical examinations. The outcome of them is that in dry weather the supplies of the companies drawing from the rivers are fairly good, but in storm periods the organic matter is largely increased, and the variations at the intakes are reproduced in the water supplied. The first flush of storm water does not carry away all impurities, and some

time elapses before a river returns to its normal dry-weather condition. Therefore, storage reservoirs, if provided, would have to be charged with foul water. Further abstractions from the dry-weather flow of the rivers would interfere with the proper flushing of the lower reaches.

From the later evidence we select some items of direct engineering interest:—

The Kent Company's Wells.

Mr. Wm. Morris, of the Kent Company, handed in returns of the average depth of the water from the surface of the ground in the Company's wells for a maximum supply period of thirteen weeks (ending July 9, 1892), for a maximum supply period of six months (ending June 30, 1892), and for a maximum supply period of twelve months (ending December 31, 1891). The average daily supplies were:—

For the 13 weeks	14,213,000 gallons.
" 6 months	13,772,000 "
" 12 "	13,534,000 "

The depths for the year were as follow:—

	Depth of water.		
	When pumping.	When at rest.	
Deptford: New well ..	74	21 5	daily
" Garden well ..	68	20 1	daily
" Bath well ..	66	19 5	occasionally
Plumstead No. 1	107	78 0	daily
Crayford: No. 1	35	—	occasionally
" No. 2	25	—	occasionally
" No. 3	33	—	—
Shortlands: No. 1	31	—	daily
" No. 2	31	—	continuously
Orpington: No. 1	79	—	daily
" No. 2	80	—	continuously
Wilmington	46	7 0	daily

Mr. Morris also supplied a one-inch map, upon which were marked the positions of all the wells, and also a section of the valley of the Ravenshoe showing the stratification at each of the wells, the line of saturation, and the depth of the bore-holes. They found, he said, that when they ceased pumping, the water in the wells came back to its old level. The wells at Deptford were working by day only. Pumping pulled them down to the levels stated; when pumping ceased they came back to about Ordnance datum. They had varied a little; the more water was pumped, the lower they went; when pumping stopped they came up again. There was some communication between the wells at Deptford, and the other day the level of the Garden well fell 2 ft. from pumping at the Bath well. They are about 300 yards apart. The other wells have no effect on each other. The Orpington well is a long way from the river; its overflows gravel-pits close to the pump, and adjoining wells which go down to the lower water-line indicate a range of 40 ft. variation in the level of the water. In all probability the quantity of water supplied would be higher this year than it was last. As to the depth of water in the wells, something depended upon the rainfall. Last year there was a favourable rainfall, and in the autumn the water stood higher in some of the wells than it had done before.

The New River Company's Wells.

Mr. Joseph Francis, of the New River Company, recalled, handed in a return of the average daily discharge of Chadwell Spring for each week of 1889, 1890, 1891, and 1892 up to March. The daily average for 1889 was 3,618,000 gallons; for 1890, 2,412,000; for 1891, 2,001,000. In four weeks of September and October, 1891, the discharge was under 500,000 gallons a day. The low averages for 1890 and 1891 are attributed to the remarkable scantiness of the rainfall during the six months preceding the summer. It had been erroneously inferred from evidence taken in 1867 that the daily flow averaged 4,500,000 gallons for a year. It now appeared that that average was reached only in some of the weeks of the early months of 1889, while in the autumn the flow fell as low as 720,000 gallons, and in the last six months of the year only one week rose above 3,000,000 gallons. The spring answered somewhat quickly to a period of drought. If there were a series of wet years, the average would probably rise again to 4,500,000. The facts raised the presumption that, as a permanent source of supply, the spring was not much more, if any more, reliable than the flow of an ordinary stream; and, therefore, in the return of water that could be relied upon he had put it down at

a low figure,—about three-quarters of a million,—the lowest that it had been for any length of time. The interval that occurred between a wet season and the rising of the volume was variable. In very dry months a large rainfall did not affect the well at all. If the rain came in the winter, when the ground was saturated, then the spring got the full benefit of it. The pumping at Broadmead well, or any other of the Company's wells, had no effect on the Chadwell spring.

Mr. Francis produced a section coloured to show the strata at the wells, the levels of the water under ordinary working, and the levels to which it rises when the pumps are not working. Asked whether there had been any permanent lowering of the last-named level, he said there had been some in the wells nearer to London. We knew that under London the water had been falling at the rate of about 18 in. a-year for many years. At Betsfield and Campshourne the water did not appear to return to the river Lea level, and there were records indicating that the water at Betsfield well had stood higher than it did now.

The East London Company's Wells.

Mr. W. B. Bryan, of the East London Company, produced a one-inch map showing the relative positions of the Company's wells and rain gauges, geological strata, Ordnance datum, and the levels at which the water stands in the wells when they are not being pumped from. Asked whether the level of the Lea Bridge well had ever sunk, he said,—No. Whilst pumping was going on the headings had to be kept dry. When pumping ceased the water rose rapidly within a few feet of the indicated level, and the last few feet it rose very slowly. There was no record of the permanent sinking of the level of any of the wells, because they were now in process of construction. The Waltham Abbey well was the one that had been pumped the longest for five years. The pumps were drowned, and had been since the water was let in upon them, and the water rose to the height indicated when pumping stopped for ten hours. The rest level was just where it was when they began, as nearly as they could tell.

Wells alleged to be affected.

Mr. T. S. Tilley, well-engineer, of Walbrook, City, said he had acted on behalf of the Enfield Local Board in sinking wells; and he had gained knowledge as to the following wells, the water-levels of which were sinking:—

The Waltham and Cheshunt Gas Company's Well, close to Waltham station on the G. E. railway, bored in the chalk, 85 ft. In 1880 the water flowed 1 ft. over the surface. In 1892 the water level when at rest has decreased to 18 ft. from surface.

Well at "The Cedars" (Mr. S. Warren's), Theobald's-square, Theobald's-park, Cheshunt, about 300 yards west of the main road. Bored in the chalk 114 ft.; water line, 1890, 19 ft. from surface; 1892, water line when at rest, 22ft. 10in. from surface.

The Edmonton Union Well, Union-lane, Edmonton, about half a mile west of the high road from London. Bored in chalk, 165 ft.; water line, 1880, 25 ft. from surface; 1892, water line 63 ft. from surface.

The Enfield Local Board Well, close to Ponder's End station on the Great Eastern Railway, is sunk to about 100 ft. in the chalk; a heading is 100 ft. long in the chalk, and a boring is continued a further depth of 100 ft. This well in the night or early morning yielded from 80 to 100 gallons per minute more than in the daytime.

Well at Royal Small Arms Factory, Enfield Lock. Water level, 1883, 3 ft. 6 in. from surface; 1892, 19 ft. from surface. The water supply is from the chalk.

The following wells appeared to be affected by the pumping of the Water Companies:—

The Waltham & Cheshunt Gas Company's Well.—The nearest pumping well, drawing a large supply, is that of the East London Waterworks Company, about three-quarters of a mile south-east.

The Cedars Well.—As to this, the witness said he could only surmise that this is affected by the large wells of the New River and East London Companies to the east and west.

The Edmonton Union Well.—As to this well, the nearest pumping well drawing a large supply is the New River well at Highfield-row, Winchmore-hill. This well is about one and a-quarter miles W.N.W.

Slip and Short Stroke in Pumping.

It will be remembered that when Mr. Binnie, the Chief Engineer to the London County Council, was before the Commission, he spoke strongly of the fact that the Company's returns of water supplied had not made allowance for slip and short stroke in the engines. Mr. Restler, of the Southwark and Vauxhall Company, was examined on this question but recalled to hand in some information that had been asked for previously. One return showed the maximum daily supply for any seven days, any month, any three months. September, 1891, furnished the week and the month, and the quarter was the three months ending October, 1891. The respective quantities, deducting 10 per cent. for slip, short stroke, &c., were 26,301,700, 25,473,451, and 24,902,729 gallons.

In answer to the Chairman, the witness said the deduction of 10 per cent. was not in conformity with the returns made to the Water Examiner, to whom the gross quantities were always returned. The Company had made some careful experiments in order to ascertain what the deduction ought to be. They had an automatic arrangement which they had attached to the engines, of the direct-acting type, and they found in some cases that the actual loss due to variation in the length of stroke amounts to 9.33 per cent. To this had to be added the slip of the valves, and the water used for sand washing and for the supply of the condensers. Some of the experiments were made in 1856 and 1858, and some in the present year. The attention of General Scott and of the late Sir Francis Bolton was called to the fact that the Companies were returning the gross quantities. At the time of the Health Exhibition Conferences, in the presence of the engineers of the Water Companies, the subject was specially discussed, and it was thought advisable to continue the returns as they were, for the sake of comparison.

The Chairman: One can easily understand that as arising from the desire to make the long series of returns comparable the one with the other.

Natural Filtration in Gravel Beds.

The value of the natural filtration supply of the Southwark and Vauxhall Company was the main subject of a further examination of Mr. J. W. Restler, C.E., the Company's engineer. Mr. Restler produced detailed analyses by Dr. C. Meymott Tidy. First, there were twenty-four samples of water from the gravel, and, for comparison, an average of thirteen from forty-three samples of Thames water. The twenty-four samples were taken from July 18 to October 5, 1889; the thirteen from December, 1889, to December, 1890. Mr. Tidy wrote of the twenty-four samples "that they were all perfectly clear and bright; but they had all a neutral reaction; that they presented great uniformity of composition; that I consider all the samples good, wholesome, and of excellent quality." Again, writing on July 7, 1890, of gravel waters he said:—"Herewith analyses of samples to June 15. All the waters are of most excellent quality,—good, pure, and wholesome." The following are some of the results of the analyses:—

	Gravel.	Thames.
Total solid matter, grains	20.24	20.16
Ammonia	None.	None.
Nitrogen in nitrates and nitrites, grains.....	0.089	0.115
Oxygen required	0.038	0.033
Organic carbon, part per 100,000	0.109	0.116
Organic nitrogen per 100,000	0.033	0.034
Lime (CaO)	8.91	8.18
Chlorine	1.149	1.224
Hardness before boiling	14.5	13.9

In answer to the Chairman, Mr. Restler said the samples of water from the gravel were taken by one of the Company's inspectors from the pump-wells of the engines that were lifting the water. Dr. Tidy was supplied with a sample daily, Sundays excepted, from July 18 to October 15, and the witness did not know on what principle the twenty-four had been selected. There was no request that each sample should be analysed, and it was presumed that those analysed were representative. The comparison of these natural filtration waters was with filtered Thames water.

Professor Dewar: And the general result is to substantiate the statement made that there is no practical difference between the filtered Thames water as it is supplied to London and the artificial water that you were testing?

Witness: No; that was the point that the directors desired to be very clearly informed upon.

There is no difference beyond a very small addition in the case of the chlorines?

Yes, that is so. The gravel water, added the witness, was not supplied to the public without subsequent filtration. It was thought it might have been a substitute for artificially-filtered water, but an opinion was expressed by the Water Examiner that it ought to be passed through a known thickness of previously-prepared material, and the Directors then said they would not raise the point at all, but they would proceed with the extension of their filters and pass all water through them, whether it came from the gravel or not. This decision was taken subsequently to the reports of Dr. Tidy. The quantity of water taken from the gravel was slightly reduced, because it had been necessary to construct a puddle-wall which had cut off a proportion of the spring water, and there was a large proportion of Thames water now admitted which had to be filtered in the ground, and when it was brought in had to be left there. In time that would accumulate, and then it would be necessary to either wash the material surrounding the flow-pipes or to change their position. At present the diminution was something like 10 per cent. The works on the island were not affected by the puddle-wall, and were yielding as much water as before. The water obtained from the island was the least satisfactory, because at times, and when the pumping was rapid, a sort of red sandy material came through with the water. It was mainly on that account it was decided to pass all the water through filters.

In reply to Mr. Mansergh, the witness said that the samples analysed included water passed from the Thames as well water from the gravel. The beds gave from 5,000,000 to 6,000,000 gallons a day, and from 3,000,000 to 4,000,000 gallons came from the gravel. Asked to show the exact area of the gravel bed, he said he could not show the southern boundary, because the bed passed under the river. There was no doubt of that because there was a considerable difference in the thickness of the ballast between the river bed and the surface of the clay. The outcrop of the clay extended under the works of the Chelsea and Lambeth Companies, who also availed themselves of this natural filtration.

Mr. Mansergh: We want to know, as nearly as we can, whether it is really natural water, or whether it is water taken from the Thames and subsequently filtered?

Witness: Of course that can easily be proved by shutting off the river intake and continuing the pumping.

Do you filter the water you take from the ground as slowly as you filter the water taken from the Thames?

Witness: It is all pumped in together, and we make no difference.

Sir A. Galkie: Have you made any observations as to the relation between the rainfall and the variations in the quantity of water you can pump from the gravel beds?

Witness: We have not made such observations.

Have you noticed any such relation?

Well, not so much in the rainfall; but with the variation of the level of the river there is a marked difference. Directly the level of the river approaches the level of the ground, we can pump practically any quantity of water we require from it without affecting the level at all; in fact, we have at times pumped from 15,000,000 to 16,000,000 gallons a day, and still been unable to materially diminish the water we could obtain.

Of course, that is just in another way an answer to my question—the level of the river depends upon the rainfall?

Witness: Yes.

And any variation in the level of the river would produce a corresponding variation in the quantity of water you can pump?

Yes. I rather think that when the level of the river gets at all high it gets above the portion of the bank that is sealed. The river there has a covering of a sort of clay deposit, which is practically equal to a puddle, and as soon as the river gets above that and really floods the ballast, then, I fancy, the water-supply is increased to us.

This concluded the examination of this witness.

The Commission sat on Monday, and heard Mr. Mullens, of Bromley; the Secretary and

Inspector of the Thames Conservancy; Mr. Lutter, C.E., Chairman of the County Council of Middlesex; Mr. Kittering, of Enfield; Mr. Tilley, well engineer; and Mr. Messer, formerly a millowner on a stream near Uxbridge, who said the Colne was diminishing in volume.

On Tuesday was heard the case of the Hertfordshire County Council; and the Commission has now adjourned for the long summer vacation.

THE ARCHITECTURAL ASSOCIATION.

A SPECIAL general meeting of this Association was held on the 22nd inst. at 9, Conduit-street, Regent-street, W., to consider the resolutions printed in the following requisition:—

"To the Hon. Secs., Architectural Association:— Under the terms of By-law 15 we hereby require you to call a Special General Meeting of Members to consider the following resolutions:—

1. That the Committee having declared that one of the names placed on the voting lists recently issued was improperly so placed,—the gentleman having resigned his membership,—the Committee alone are responsible for the error, as no public notice whatever is taken of resignations during the session, and therefore the general body of Members does not know who has resigned.
2. That the number of votes given to this gentleman (now declared to be lost) would have been distributed among the other candidates, and that, therefore, the declared result of the voting is most unsatisfactory and misleading, if not actually invalid.
3. That this meeting, therefore, directs the secretaries to issue proper and correct voting papers, to secure their proper counting, and to have the result duly declared as the election of Committee and officers for session 1892-3.

The requisition was signed by Messrs. C. H. Brodie, Walter Dawes, J. E. Cadier, Chas. H. Freeman, Percy E. Newton, Sydney Tugwell, Edw. Greenop, Percy D. Smith, Thos. Edward Pryce, John Todd, J. Strasson, G. A. Lansdown, Sydney B. Beale, Walter Millard, and J. W. Stobold.

The proceedings were opened by Mr. C. H. Brodie, who proposed the appointment of Mr. H. O. Crosswell as chairman. Mr. Sydney B. Beale seconded. This having been agreed to,

Mr. E. S. Gale, senior honorary secretary, read the requisition which we print above, and the By-law referred to in it.

The Chairman said that it might be desirable at that stage of the proceedings to ask the Secretary to read a statement of the facts of the case which had been drawn up by the Committee and submitted to counsel, and also the opinion of counsel upon that statement. Certain gentlemen who had signed the requisition had attended before the Committee, and had expressed the desire that counsel's opinion should be obtained, and in deference to that desire the Committee had obtained that opinion.

Mr. E. S. Gale then read the statement which was submitted to counsel, in which it was mentioned that after the list of gentlemen nominated to serve as officers for session 1892-3 had been posted to members, it was discovered that Mr. Gerald C. Horsley's name had no right to be on the list, as he had resigned his membership of the Association. The Committee decided that as Mr. Horsley was not a member at the time of nomination, he was ineligible for election, and consequently any votes given for him would be lost. As it was, enough votes were not given to Mr. Horsley to secure his election, but it was said that the fact of Mr. Horsley's name being on the list made the election null and void, as the votes given to Mr. Horsley were wasted.

The opinion of Mr. Frederick Laing, barrister, was then read, in which he gave it as his view that the election was a good and valid one, and could not be set aside and declared void.

Mr. Brodie said that it was quite true that he and others did express the wish that counsel's opinion should be taken, but they also expressed the wish that the statement to be submitted to counsel should also be submitted to the scrutineers, and should be approved by them. To put it mildly, a very strong "lead" had been given in that statement of facts. He hoped the meeting would support him in his desire that the whole of the report of the scrutineers should be read, for it was almost necessary to know the number of votes recorded for Mr. Horsley before they could discuss the resolutions contained in the requisition. The whole point was, that if the votes had not been given to Mr. Horsley they would have been given to some one else, and the result of the election would have been different. He moved that the



Decorative Panels: "Music, Sculpture, Painting." Miss E. M. Rope, Sculptor.

Secretary he instructed to read the whole of the scrutineers' report.

This was seconded by Mr. Beale, and, after a long discussion, agreed to, and the report of the scrutineers was read.

Mr. Brodie then proposed the first of the resolutions printed in the requisition, and, in doing so, referred to the fact, as revealed by the report of the scrutineers, that there were five candidates within nine votes of each other. Mr. Horsley received 225 votes, and although there was such close voting, the Committee took upon themselves to rule that 225 votes had been lost. Mr. Horsley, at the time of his nomination, was present, and he and his proposers, and, in fact, everybody else, considered him to be a member of the Association. The error of allowing Mr. Horsley's name to be upon the voting-paper was entirely the Committee's, and yet they wanted to make other people suffer for their error.

Mr. Beale seconded the resolution.

Mr. H. D. Searles-Wood said he wished to propose the following amendment:—

"That the Committee having declared that one of the names placed on the voting list recently issued was improperly so placed, this meeting is of opinion that it was properly placed, the gentleman being a member of the Association at the time."

Mr. Leonard Stokes said that at the first meeting of the present Committee at which he was present he re-stated the facts, previously stated to the old Committee, respecting Mr. Horsley's resignation, and the Committee came to the conclusion that Mr. Horsley was a member of the Association at the time of his nomination for the Committee.

Mr. Brodie said that the By-law stated that only resolutions contained in the requisition could be discussed.

Mr. Cole A. Adams said he could quite understand Mr. Brodie's unwillingness to discuss the question as to whether Mr. Horsley was a member or not at the time of his nomination. If Mr. Horsley was a member at that time then the whole difficulty was solved.

Mr. Beale said he could not agree with Mr. Adams. At the last ordinary meeting of the Association,* the President ruled that no discussion could take place as to Mr. Horsley's election, and since that time the circumstances had not altered. The meeting had met to consider the resolutions contained in the requisition, and they had to consider the case as though Mr. Horsley was not a member.

The Chairman said he would mention what steps the old Committee took to investigate the question of Mr. Horsley's membership. At the meeting of the Committee that was held after the issuing of the voting papers, the question was raised as to whether Mr. Horsley was a member or not. The Minute Book was referred to, and a letter was found from Mr. Horsley in which he resigned his membership. No other reference to the matter was found, and infor-

mately Mr. Stokes at that time had resigned from the Committee, or doubtless he would have reminded them of the fact that he had been asked to see Mr. Horsley and get him to withdraw his resignation.

Mr. Cole A. Adams said the whole matter was reduced to this, there had been a misunderstanding. Mr. Horsley had sent in his resignation, and, according to the Minutes, the letter had been allowed to lie on the table. Mr. Stokes was asked to see Mr. Horsley, who agreed, to withdraw his resignation, and subsequently Mr. Horsley was asked, and agreed to stand for election on the Committee. The general impression, therefore, was that Mr. Horsley was a member, and the list of candidates containing Mr. Horsley's name was fairly voted upon. Supposing the resolution was carried, what would the result be? One result would be that they would lose an immense amount of time which was of great value to the well-being of the Association; and it seemed to him monstrous that such valuable time should be thrown away on such vexatious matters. The Committee had acted in the name of the Association, and had acted in a courteous manner to the requisitionists. Connell's opinion had been obtained to the effect that the election was a valid one. It was not likely that counsel would be influenced in the way in which the case had been put. It would be sheer waste of time if the election were to be declared invalid, and he supported as strongly as he could the amendment proposed by Mr. Searles-Wood.

Mr. F. T. W. Goldsmith said he thought that the Committee were perfectly willing to admit that they had made a mistake in declaring that Mr. Horsley was not a member of the Association at the time of his nomination; but he thought that the meeting would agree that they acted in good faith.

Mr. Owen Fleming said that he was perfectly certain that Mr. Horsley was a member of the Association at the time of his nomination, and, although he did think the action of the past Committee was somewhat unnecessary, still he should support the amendment, as he thought there had been enough quarrelling.

Mr. E. S. Gale said that when Mr. Horsley's letter of resignation was received by the Committee, it was agreed that it should lie upon the table. No resolution was come to, but he was under the impression that the sense of the meeting was that he should deal with the resignation in the usual manner. He, therefore, wrote accepting it, but he now believed that in doing so he had made a mistake. Mr. Stokes had obtained Mr. Horsley's verbal withdrawal of his resignation, and the question then arose as to whether Mr. Stokes reported that to the Committee. Nothing appeared on the Minutes showing that he reported it, and he (Mr. Gale) had no recollection of his doing so.

Mr. Pryce said the votes given to Mr. Horsley were lost. He could not support the amendment, although he was glad that the Committee

had decided that Mr. Horsley was a member of the Association.

Mr. Gale said that the Committee had decided that Mr. Horsley was still a member of the Association, because that night he had stated in writing that he wished to withdraw his resignation.

A member asked why, if Mr. Horsley received a letter from one of the Secretaries accepting his resignation, he agreed to be nominated?

Mr. Stokes said that after the receipt of Mr. Horsley's letter, he was asked to see Mr. Horsley and endeavour to get him to withdraw his resignation. Mr. Horsley, being told that the letter from the Secretary had been sent in error, agreed to withdraw his resignation, but not his letter, as he wished to protest against a certain policy pursued by the Association. He (Mr. Stokes) told the Committee this, and three members remembered the circumstance; but the rest had forgotten it.

The Chairman then put the amendment to the meeting, when 47 voted for it, to 23 against it.

The amendment, on being put as a substantive motion, was carried by 47 to 20.

A vote of thanks was then passed to the Chairman, and the meeting terminated.

DECORATIVE FIGURES FOR PANELS.

THE three little figures here illustrated, representing Music, Sculpture, and Painting, were modelled by Miss Ellen M. Rope, and are intended as decorative figures for panels in a mantelpiece.

ROYAL ACADEMY:

ADMISSIONS TO THE ARCHITECTURAL SCHOOL.

THE following Students have been admitted to the Architectural School of the Royal Academy, Mr. R. Phené Spiers, Master:—

Upper School.

H. P. Adams.	P. G. Newton.
C. W. Baker.	R. A. Reid.
J. Barrowman, jun.	A. Dunbar Smith.
A. W. Cleaver.	A. E. Yeates.

Lower School.

H. B. Crosswell.	A. A. Reeve.
W. H. Hazell.	H. A. Saul.
T. G. Lucas.	

THE ENGLISH IRON TRADE.—The English iron market generally remains very quiet. There is more activity, however, shown in the Glasgow warrant market, the business being chiefly in Scotch warrants. In Scotch-makers' iron there is rather more briskness, and quotations have been advanced. Manufactured iron and steel remain quiet on the whole, and tinplates are rather inactive. Ship-builders and engineers are only moderately engaged. The coal trade is dull.—Iron.

* See Builder for June 4, 1892, p. 413.

INCORPORATED ASSOCIATION OF
MUNICIPAL AND COUNTY ENGINEERS:
ANNUAL MEETING AT BURY.

THE annual meeting of the Association of Municipal and County Engineers was held on Thursday, Friday, and Saturday, July 21, 22, and 23, at Bury, Lancashire. The meeting was held on the first day in the Council Chamber of the Town-hall, on the walls of which were displayed the drawings for the various public works in progress or in contemplation, including the premiated designs for the new Municipal Buildings, the designs for new markets and abattoirs, and the plans and sections of the new reservoir at Clough Bottom and of the proposed additional refuse destructors.

The Mayor (Councillor Ashworth) having offered the Association a very hearty welcome to Bury, spoke in terms of high praise of the ability and sound judgment of the Borough Engineer, Mr. J. Cartwright.

The retiring President (Mr. T. de Conroy Meade, of Ilorsey) took the chair. There was a large attendance of members of the Association present.

The Chairman having suitably acknowledged the compliment paid to the Association by the Mayor,

The Secretary (Mr. Thos. Cole) read the annual report of the Council. It stated that since the last annual meeting in London there had been five district meetings. The meeting at Dublin opened out a new field by bringing into the Association gentlemen holding positions as County Surveyors. The Council had in consequence formed Ireland into a district. During the financial year ended April 30 last 106 new members (ninety-four ordinary and twelve Graduates) had joined the Association. Three names had been written off, and the Council expressed regret at the death of several members. The number of members at the end of the year was 503, and the balance sheet showed a balance in hand of £104. 5s. 11d. Since the last report, two examinations had been carried out, fifteen candidates out of the twenty-four who presented themselves satisfying the examiners. The next examination will be held at the Yorkshire College, Leeds, on September 30 and October 1. The Parliamentary Committee had considered various suggestions received from members of the Association with regard to amendments of the Public Health Acts; and the amendments thus formulated were communicated to the Chairman of the Police and Sanitary Committee for his consideration. The award of premiums for the two best papers read during the twelve months had been made, the first, £10, going to Mr. J. Walker, of Croydon, for his paper entitled "Some of the Public Works of Croydon," and the second, £5, to Mr. R. Godfrey, of King's Norton, for his paper on "Wayleaves and Easements." The Council had deemed it necessary to oppose the application of the Sanitary Inspectors' Association for incorporation, and the application of the Sanitary Institute for a Royal Charter, with regard to the clauses relating to examinations and granting certificates of competency to Municipal and County Engineers. Negotiations were in progress which were likely to result in a satisfactory arrangement, in which case the opposition would be withdrawn.

On the motion of the President, seconded by Mr. Broom, of St. Helens, the report was approved without discussion.

The President then presented the premiums awarded by the Council to the two gentlemen whose names are stated in the abstract of the report given above.

Mr. C. Jones (Ealing) proposed that the Honorary District Secretaries hold office until the next meetings in their respective districts, which was seconded by Mr. Bierley (Newtown-Makerfield), and adopted.

Messrs. R. Godfrey (King's Norton), G. E. Eachus (Edmonton), E. J. Silcock (King's Lynn), and J. C. Rufford (Parker) were elected Scrutineers; and Messrs. J. Packer (Hereford) and A. Creer (York) Auditors for the ensuing year.

Mr. J. T. Eayrs (West Bromwich) proposed—

"That in view of the fact that the Association now numbers over 500 members, the number of elected members on the Council ought to be increased from twelve to fifteen, and this General Meeting begs respectfully to request the Council to take such steps as may be necessary to have the Articles of Association amended in order to carry out this resolution."

He pointed out that this year three District Secretaries had been elected on the Council, thus reducing the voting power of the members by three votes during the year.

Mr. Lobley (Hanley) seconded the proposition, which was supported by Mr. Godfrey (King's Norton), Mr. Davis (Aston), and Mr. Jones (Colwyn Bay).

Mr. C. Jones opposed the motion, on the ground that it would involve an appeal to the Board of Trade to alter the Articles of Association, which had been just completed; it was also opposed by Mr. Bierley (St. Helens) and Mr. Lemon (Southampton), who said that his experience of large Councils was that they never worked satisfactorily.

On being submitted to the meeting, the proposition was adopted by a considerable majority.

The retiring President (Mr. Meade) then installed the President-elect (Mr. J. Cartwright, of Bury) in the office, and, in doing so, congratulated him upon his unanimous election to that position.

Mr. C. Jones (Ealing) proposed a vote of thanks to Mr. Meade for his able conduct of the Presidential office during the past year.

Mr. Eayrs, in seconding the vote of thanks, said that Mr. Meade's year of office would be always marked by the large accession of members and the progress made by the Association.

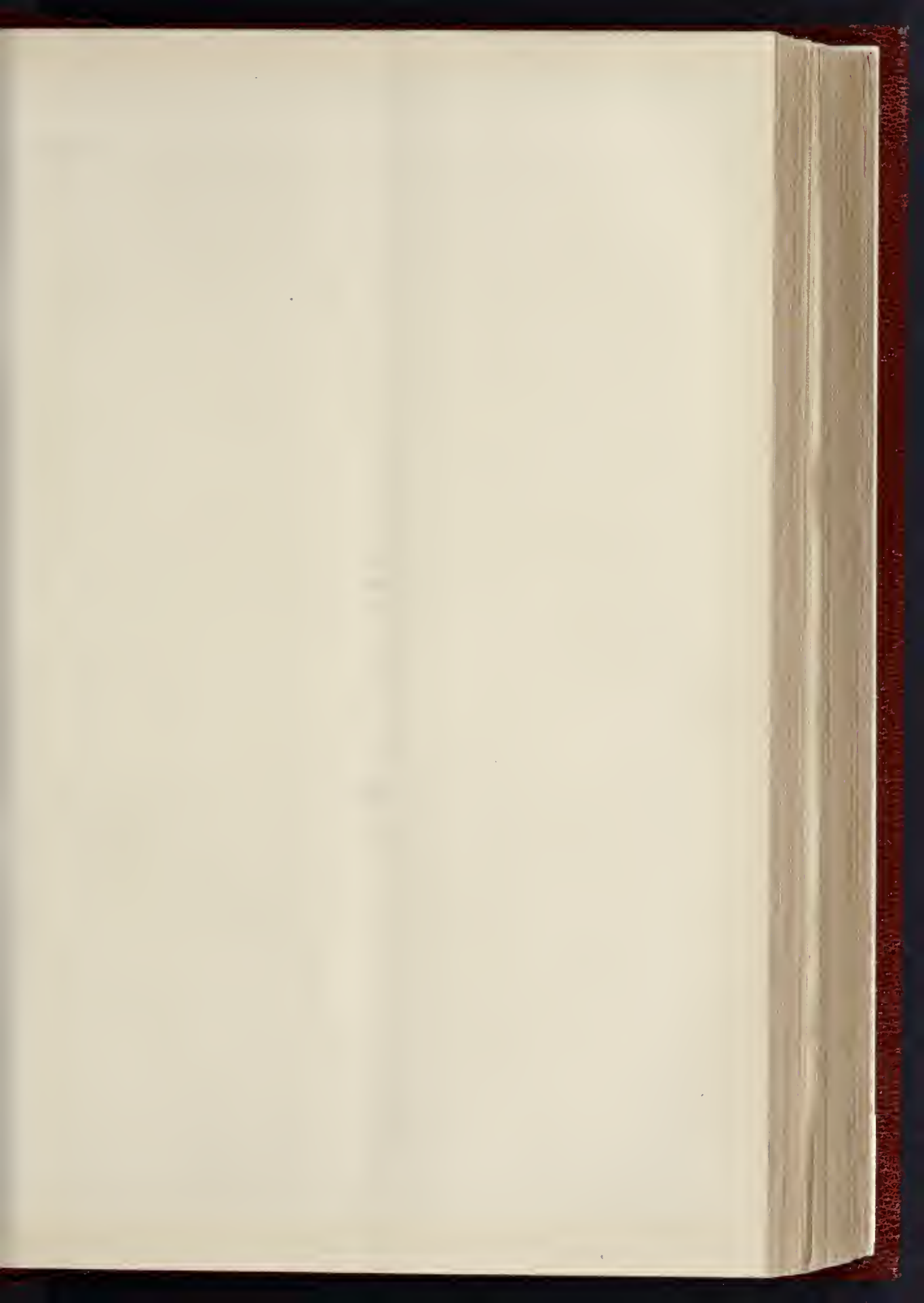
The vote of thanks having been accorded by acclamation,

Mr. Meade suitably acknowledged the compliment paid to him.

The President's Address.

The President then delivered his inaugural address. He commenced by saying that the Association of Municipal and County Engineers had so advanced in numbers, had made its influence so widely felt in legislation on the sanitary requirements of the day, and had so grown in the estimation of the municipalities and other governing bodies throughout the kingdom, that its importance and responsibilities increased with each succeeding year of its existence. To be elected the President of that Association was the highest compliment a municipal or county engineer could receive; for the honour conferred upon him and the borough he represented he tendered them his sincere and hearty thanks. Former Presidents of the Association, following in the steps of the President of what they were all justly proud to designate "The Parent Society," the Institution of Civil Engineers, had as a rule dwelt in their addresses upon some special points of practice with which they were immediately concerned, or some engineering feat of skill that was occupying the attention of the country at the time. If he did not follow on the orthodox lines, it was not for lack of matter, for, not to go outside the county in which they were met, there were at the present moment vast works of engineering skill in active operation or approaching completion that would form a record second to none the world had witnessed, and which would add much to the fame of the civil engineer during the Victorian era. To enumerate the numerous works of sewage purification and reservoir construction, and other works which many of the Lancashire towns were actually engaged in constructing, and which in the aggregate represented an enormous sum of money, would form no mean record. Passing from these, he would mention four works, each of which would form a theme in itself, viz., the Preston Docks, the Manchester water supply from Lake Thirlmere, the Manchester Ship Canal, and lastly, that magnificent undertaking, the difficulties of which had been so numerous, but which, thanks to one of their honoured members, whom he was delighted to see with them at that meeting, had been brought to a successful issue—he alluded to the impounding and conveying to Liverpool the water of the Vyrnwy. His remarks would be confined to the advantages of the Association, the relationship of the members to it and to the Authorities they served; the duties and responsibilities of a municipal engineer to the community, and the duty of the representatives and the community towards the engineers. From an experience of nearly twenty years (having joined the Association at its commencement) he could testify to the benefits to be derived from membership, not only to the members, but also through them to the Authorities they served. The reading of papers; the taking part in the discussions, in

however humble a way; the listening to the opinions of those actually engaged upon the works under consideration, were of the greatest advantage to the engineer, often informing his mind on points of doubtful practice, and assisting him in a way that nothing else could so well do. It might be that the information he was anxious to obtain was not prominently to the fore at the particular time he sought it; but even if so, an observant man could always learn something at such meetings, and carry away some germ of thought to fructify in after days. It appeared to be one of the outcomes of the present day that men should bind themselves together to promote their general weal, and though he had great faith in silent thought and private research, he readily admitted that associations such as that, whose fundamental object was to obtain and distribute knowledge on points of practice, were to be commended. It might be said that engineers in past days designed and executed works of skill without such intercourse. It was said of Brindley (who, by the way, successfully carried out the construction of the Bridgewater Canal, a Lancashire work of no mean order in its day) that when puzzled and in doubt upon any point of practice, he went to bed and thought steadily for a day or two; but we should hardly consider that plan suitable to these modern days. If Brindley had belonged to such an Association as theirs he might have solved the problems that so puzzled him in a more cheerful way than lying in bed. However that might be, there was little doubt that much knowledge and experience gained in former days had been lost to us from a lack of the means of recording it. We knew that the ancient Egyptians and Assyrians had knowledge of the casting of bronzes and the removal of heavy materials, in ways of which we to this day remained ignorant. Whilst, therefore, encouraging quiet thought and study, without which it was scarcely possible to succeed, he would put in a plea for the support of their Association, which enabled its members to add to their knowledge from the experience of others, in visiting their works and hearing their views, and which, at the same time, provided the opportunity to members of submitting their own works and views to the test of those whose opinions were worth hearing. Passing to the importance of the duties and responsibilities of the sanitary engineer, he said these, if carried out aright, had a beneficial bearing upon the health and prosperity of the people. The demolition of insanitary property, the cleansing of slums, the removal of refuse from the vicinity of dwellings, the introduction of pure air into dwellings and workshops, the erection of baths and washhouses; the provision of libraries, museums, art galleries, and places of public recreation, all tended to the improvement of the community both physically and morally; and notwithstanding increased expenditure, improved pavements, new and better means of communication, improved methods of lighting, heating, and ventilating, the cheapening of the production of mechanical power, increasing the supply of fresh water, brought in their wake increased prosperity and means of happiness. To competently discharge the duties of his office, the engineer must have a suitable training. It was unnecessary to emphasise the claims of theoretical or technical instruction. The country was alive to the needs, and had met the want. At school or college, our younger men had only to desire and they gained the knowledge they sought; but the training essential to an engineer must amount to lecturing would make the student proficient in filing and chipping; no correct knowledge of the nature of materials could be gained otherwise than by handling them. The knowledge of the component parts and arrangements of a steam engine, a boiler, a pump, a dynamo, or any other product of mechanism, was more completely acquired by one careful inspection of the article than by fifty lectures on its construction. No written description of concrete, mixing of puddle, preparation of foundations, whether in trench, tunnel, or excavation, of road-making, or of house-refuse disposal, was of half as much avail as an inspection during operation. The municipal engineer must also comprehend mind as well as matter; although the country was coming to the opinion that there was need of sanitary reform, still he would find prejudices to subdue, obstructions to surmount, and difficulties to overcome. There were members of Sanitary



THE BUILDER, JULY 30, 1892.



Authorities who were elected and accepted the office for the sole purpose of reducing or "keeping down" the rates, and who to the peace of mind of the engineer who was called upon to serve an Authority composed of such men,—men who, regardless of the health and comfort of the inhabitants, and mindful of their duties as judicial expenders, sought by an ostentatious display of false economy to pose as the people's best friends. Such Authorities as these were generally imbued with the sentiment that they had little or no need of a skilled engineer; their principal ambition was but to evade the law and not to conform to it, by doing as little work and paying as little in salaries as possible. That idea, he was thankful to say, was weakening. Sanitary bodies were gradually recognising the folly of the penny-wise and pound-foolish policy, and trained engineers of practical experience, of sound education, and common sense were in increasing demand. It was for them as an Association to assist in fitting their younger engineers to meet this new order of things. Like Mr. Gilbert's policeman, the life of the Surveyor to an average Sanitary Authority could not be called "a happy one," the number and differences of temperament, the constant change of his Board or Council, rendered his position often one of difficulty, doubt, and anxiety. It was said that "the proper study of mankind is man." That sentiment he commended to the Municipal and County Engineer, who, though he had all knowledge besides, and did not know his fellow man, was not likely to succeed. Passing from the engineer to speak of the Authority and the community, he said that we might have competent engineers able and willing to devote their energies to the carrying out of sanitary reforms, but if the community and their representatives did not truly understand their duties, the efforts of the engineer would be minimised if not altogether lost. Why did a Sanitary Authority exist at all? Simply because by the springing up of a community the individual could no longer control his surroundings. Could he do this, he would in self-defence look to the sanitary conditions about him, but since it was impossible he could purify the atmosphere, or the rivers, or efficiently dispose of large quantities of sewage and refuse, or carry out the thousand needs demanded where there was an aggregation of people, the Legislature had wisely determined that where that condition came in, the community collectively should do what the individual could not do. It was conclusively established, though there were differences of climate, of habit, and surroundings which militated against the comfort of one district as compared with another, that the advancement of medical and sanitary science was such as to make it possible to have an increased health rate and a reduced death rate. The duty of the Sanitary Authority was simple and definite. It was to carry out the various Public Health and other Acts which had for their object the improvement of the health and comfort of the people. On economical grounds alone it was to the advantage of a community to spend a portion of its earnings on the sanitary improvement of its district,—in a word, to increase the district or borough rate, and to decrease the poor and police rates. Statistics clearly showed that the expenditure in the larger towns had resulted in a saving to the community, and that the neglect of expenditure on needful improvements had resulted in loss and suffering. Who could estimate the benefits which had accrued in large and crowded centres by the introduction of pure air and water, the widening of thoroughfares, with the attendant demolition of hotbeds, offices and filth, and the establishment of parks, open spaces and places of recreation for the rising generation? Roads, sewers, and means of water supply had been and still were constructed on too meagre a scale. A few years passed and the works proved inadequate, then the town was forced to spend large sums in acquiring additional property, which had often greatly increased in value through the former improvement; and many instances could be recorded where through such improved value improvements had been delayed or so modified as to be of little value. An experience of thirty years in municipal matters had shown him the error of procrastination. The longer necessary reforms were delayed the worse it would be. The health, the happiness, and the prosperity of the community would suffer. Though sanitary science was making headway, there still existed much ignorance in matters

pertaining to the public health. The hulk of the people needed to be shown that money expended on the improvement of sanitary conditions was money well invested, that it was to their interest that such works should be of the best possible description, and that as by their nature such undertakings must necessarily be costly, it was the duty of their representatives to obtain the best advice. It was better to pay a few hundred pounds in salaries than to spend thousands on imperfect works designed by incompetent and less remunerated advisers. There were municipalities who had grasped the importance of following the dictates of true sanitary science, and who stood as beacon-lights to less favoured localities. The vast sum of money spent upon sanitary improvements in London, Liverpool, Manchester, Leicester, and other large towns bore witness alike to the knowledge and enterprise of their rulers and advisers. There were also smaller communities who, according to the means at their disposal, were endeavouring to pursue the same policy. Amongst these he claimed a place for the borough in which they were met, and to establish that claim he briefly enumerated the principal works executed or contemplated during the sixteen years of its incorporation. At the time of the last District Meeting of the Association in Bury in 1883 they were entering upon a large expenditure for the repavement of their streets with granite and wood. With regard to the waterworks, since 1883 two additional Acts of Parliament had been obtained, one in 1883 and the other in 1889. The latter Act gave power to construct a new reservoir on the Whitewell Brook (a tributary of the Irwell), situate in the townships of Cliviger and Higher Booth, in the Forest of Rossendale. Notwithstanding the advances made in electric lighting, the gasworks had been further extended, and powers obtained to construct a branch railway from the main line of the Lancashire and Yorkshire railway to the gasworks. As was known to some of the older members, Bury was one of the pioneers in erecting destructor furnaces; and the Corporation had decided that the time had arrived to extend those furnaces. The disposal of sewage, the improvement and the purification of streams, the lessening of smoke pollution, the demolition of insanitary dwellings, and other matters, were having the serious consideration of the Corporation. Turning from what might be classified as the active agencies of life saving and health improving works, he passed to another group of matters which were calculated to bless and aid those who dwelt among large populations. Since the former visit of the Association to Bury the inhabitants had subscribed no less a sum than 25,000*l.* for the establishment of recreation grounds. In addition, two private individuals had expended a sum estimated at 20,000*l.*, and one of them had further endowed one of the grounds with a sum of 3,000*l.* for its maintenance. The result was they had four parks at the points of the compass handed over to the borough free of cost, the Corporation undertaking to preserve the same for the use and enjoyment of the public. Preparations were on hand for the erection of an additional swimming bath, it being the intention of the Corporation to extend and encourage the use of the bath as an educational adjunct to the public school teaching. It had been decided to expend a sum bordering upon 10,000*l.* on erecting technical schools. The land had been acquired on favourable terms, not only for the school, but for the addition of an art gallery, library, and museum when the need arose for those buildings. The growing needs of the administration of the town had led the Council to consider the advisability of the erection of new Municipal Buildings, as also new markets and abattoirs. The premiated design for the municipal buildings was now being exhibited in the Royal Academy. The works, either in active progress, or which it was intended at no distant date to commence, were estimated to cost not less than a quarter of a million, whilst the abattoirs and municipal buildings were estimated to cost 72,000*l.* In addition to this capital expenditure, there had been expended on the construction of new streets, paid for by the owners of property during the same period, 104,000*l.* It was only right to observe that during the years occupied with these works, involving such large present and prospective expenditure, Bury had not been an increasing town. The enterprise had taken place rather in the face of decay in some of

its chief industries, and in spite of many drawbacks. Notwithstanding, Bury had done wisely in these matters, and had set an example worthy of imitation by other towns. Having briefly referred to the papers to be read, Mr. Cartwright concluded his address by remarking that, as in all other sciences and professions, so in their own immediate sphere of labour, skill, application, and perseverance must prevail and bring success. The Institution of Civil Engineers was by consent the representative head of the civil engineering profession, but to the branch of engineering devoted to sanitary science their own Association had become and would continue to be a power and help. He entered upon his year of office determined, with the aid of the members, to maintain the usefulness of the Association. Thanking them for the confidence reposed in him, he trusted that the ensuing year would be a prosperous one for the Association, a year of progress and success, adding new friendships and cementing old ones.

The Mayor of Southampton (Mr. James Lemon, M.Inst.C.E., a member and past President of the Association) said they would be wanting in their duty if they did not pass a very cordial vote of thanks to the President for his very instructive address. He was pleased to see that the President had brought before the members what he called the business aspect of their profession.

Mr. G. B. Deacon (Water Engineer, Liverpool), in seconding the motion, remarked that he had rarely heard an address which contained so much real, practical, good advice.

The proposition was adopted with acclamation.

The members were then entertained to luncheon at the Derby Hotel, the Mayor (Councillor Ashworth) presiding.

On the conclusion of the repast, Mr. C. Jones (Ealing) moved a vote of thanks to the Corporation of Bury for their hospitality, which was heartily adopted, and was acknowledged by the chairman.

We will continue our report of the proceedings next week.

CONGRESS OF ARCHÆOLOGICAL SOCIETIES: VISIT TO SILCHESTER.

THE second day's proceedings (July 21) of the fourth Congress of Societies in union with the Society of Antiquaries, whose opening session was reported in our last issue, took the form of an excursion to Silchester, in which all the representatives of the various provincial Societies took part, together with a small contingent from the parent society. Leaving Paddington at 10.5, a halt was made at Reading to enable the members to see, at the Museum, the results in detail of the two years' digging that has already been accomplished. The Duke of Wellington readily consented to the suggestion of the Society of Antiquaries that the Silchester finds should be deposited at Reading, and the Reading Museum authorities were prompt in providing special accommodation. The town is to be specially congratulated in having so capable and learned an honorary curator as Dr. Stevens, who has entered into all the arrangements with much zest and knowledge. Mr. Palmer, who received the visitors at the Museum, and offered them a cordial welcome on behalf of the town and corporation, stated that the general public are rapidly beginning to appreciate the value and interest of their collection, the last few summer weeks having produced a daily visitors' roll of upwards of 300 persons. The smaller of the two new rooms or galleries that have been added to the Museum for the purpose of exhibiting the Silchester remains contain models of the more important parts that have been uncovered, such as the double west gate, and the larger and architectural remains. The largest of these is a mutilated but fine capital of a Corinthian pier, which doubtless formed one of a series that upheld the roof of the great basilica. In one corner is a restored piece of Roman roofing, made from the big stone tiles that have been found on the site. There is also the fragment of an attached capital found at the south gate, and part of the Doric impost of the central pier of the double west gate. Against the wall hangs a great plan of the Roman city of Calleva Atrebatum, or Silchester, enlarged from the accurate ordnance survey, with the excavations coloured up to date. Here Mr. G. E. Fox, F.S.A., who has had chief command of the

present series of diggings, delivered a brief lecture full of well-condensed material. He pointed out how the Romans in the early days of their occupation had seized upon this important site, where ancient main British roads crossed each other, and which had previously been entrenched by the Celtic tribes, and by degrees had walled in the great area of over one hundred acres, laying it out as a town in squares with all the formality and precision now used by the city builders of the United States. Here, he remarked, we found no trace of camps or military occupation. In the North, the chief relics of the Roman sway were great walls, erected to drive back and keep out the northern barbarians; but at Silchester we came across wonderful proofs of southern civilisation, far more splendid than warlike prowess, with which the Roman for some centuries dowered our country. Within the massive flint and stone walls of Silchester resided a population that may not have exceeded some six or seven thousand souls, for the city was by no means crowded in the buildings; but when it was remembered that the population of this island was probably not then a million, such a number of souls showed a place of no mean importance, and a place of even greater relative value than Reading to-day. He pointed out the great Basilica, 270 ft. long by 60 ft. broad, with its adjacent Forum and suites of offices and shops, which occupied the central square or insula of the city, and which was uncovered by Mr. Joyce in 1863, and all the recent clearing of houses, baths, and other remains, down to the last and most important work of clearing out the area of a Christian basilica. The members then adjourned to the second Norman gallery, which was filled with well-stocked cases, where Dr. Stevens discoursed on their contents. There is a wonderful wealth of Roman pottery of every description, from the coarsest to the most delicate, and of almost every variety of article in glass, bronze, iron, and bone, as well as leather shoes, wooden linings of wells, carpenters' and smiths' tools, locks, padlocks, and keys, and a great variety of tiles and flue-pipes for heating purposes.

After lunch, the large party went by train to Mortimer, and thence by carriages some two or three miles to Silchester. Mr. St. John Hope and Mr. Fox explained the excavations after a most interesting fashion. The great amount that yet remains to be done was forcibly impressed upon the party by the extent of fields yet untouched, and the great distance between one part of the diggings and another. The houses as yet uncovered seem to have been almost entirely constructed of flints set in concrete, cornered with thin square bricks and tiles. The system of drainage was elaborate and thorough. There was much curiosity shown to inspect the remains of the little Christian basilica, which was only uncovered last June, and which is in the central block or insula of the city, to the south-east of the Forum. Of this most interesting discovery it is needless here to give any detailed account, as it was described both in letter-press and plan in the *Builder* of June 18. Much discussion arose respecting it, in which Messrs. Fox and Hope took the chief part. The Rev. Dr. Cox tried to induce any sceptics who might be present to give their arguments against the Christian theory, but all in vain; though subsequently Mr. James Parker did set forth to a few some rather wild ideas as to Pagan sacrifices, suggesting it was a temple. However, the general opinion was unmistakably in favour of its Christian origin, the plan so nearly coinciding with various known examples of Early Christian churches, notably in Numidia, and not in any way agreeing with anything as yet known as identified with the heathen rites or civilian functions. It is anticipated with some confidence that further proofs one way or the other will yet be forthcoming as the excavations advance. We even heard it breathed by one enthusiastic advocate of the Christian theory that the circular building discovered some time ago on an adjacent insula, and vaguely labelled "a temple," might turn out to be a baptistry.

A keen discussion also arose in connexion with an opening in the great wall of the city at its lowest point, between the south and east gates, that was in process of excavation during the visit. Some thought that it was a little, or postern gate, of a later date than the original walls, but to others,—and they had the best of the argument,—it seemed to be undoubtedly the sluice-gate for the main drainage of the city. The propinquity of the baths supported this

view. The only regret expressed by the congress members with regard to this excursion was the shortness of the time, and on all sides were heard determinations to revisit this site, by far the most interesting of all in Roman England. The visit of these representative archaeologists is sure to quicken general interest in these most important excavations. At the present time about 25% a week is being most prudently spent, and trouble that amount could be wisely used if only the funds came in. We may add that on Wednesday last a large party of members of the Surrey Archaeological Society visited Reading and Silchester to see the remains.

THE ARCHITECTURAL ASSOCIATION:

VISIT TO CLAYBURY ASYLUM, WOODFORD.

The building visited by the members of the Architectural Association on Saturday last is intended to serve as the fifth asylum for lunatics in the County of London, and will, when completed, accommodate 2,000 patients, exclusive of the isolation hospital.

The buildings are being erected from designs by Mr. George T. Hine, which were selected in a limited competition in 1887, since which time the buildings have been in course of erection. We may mention that we published a general view and ground-plan of the Asylum in the *Builder* for Nov. 23, 1889.

The plan is arranged on what is now generally accepted as the best model for an institution of this kind, the male and female department being separated by the various administrative offices, and the various classes of patients housed in separate blocks arranged *en échelon*.

The various blocks are differently planned to meet the particular necessities of each class of patients, the chronic wards comprising large day-rooms and dormitories, while the acute cases are housed in small wards with a large allowance of single rooms, so as to increase one of the chief advantages presented by the massing of patients in large asylums, the thorough sub-division of classes.

The detailed arrangements throughout combine all that ingenuity and experience can suggest to adapt the institution to the modern principle of treating the insane, which is curative in its aim rather than repressive, as in the days when many of our older asylums were erected. This view requires on the part of the architect that the building shall permit as much freedom as possible to the patients, while at the same time presenting the minimum of opportunities for injury either to the building or its inmates. Hence a modern lunatic asylum is full of special contrivances and arrangements which ordinary visitors would scarcely notice, and the full knowledge of which has restricted the number of our asylum specialists to a very few architects besides Mr. Hine. The modern treatment of lunacy demands also more provision for the embellishment of the asylum than is to be found in the barrack-like interiors of our older institutions. Hence the interior of Claybury Asylum is almost palatial in its finishings, its pitch-pine joinery, marble and tile chimney-pieces, and glazed brick dados, so much so that some of the visitors rather flippantly expressed a desire to become inmates. The recreation hall, for example, is lavishly decorated with an elliptical ceiling, richly ornamented with Jackson's fibrous plaster work, while the walls are panelled in polished oak, and the floors are to be finished in a similar manner.

The boiler and engine house are important features in an immense institution of this kind, in which steam is used for heating, electric lighting, laundry work, and for warming water throughout the building. The steam for all this work is generated in one central boiler-house, ten large boilers in all being provided for these purposes.

Although the building is to be lighted by electricity generated on the premises, gas will be laid on for use in emergency, and will also be used for cooking purposes in the kitchen and wards.

The building is warmed and ventilated by a system of air-flues in the walls and trunks in the basement, in which are batteries of steam-pipes so arranged that the warmed air will ascend rapidly into the different rooms. A corresponding system of extraction flues carries off the vitiated air through extracting cowls in the roofs.

Water is laid on from the East London Water Co., and a system of mains surrounds the buildings both inside and outside for fire service, while a large tank at the top of the central tower, communicating with the fire mains by an electric valve, will give immediate extra pressure, sufficient to check a fire until the pumps can be started.

The estate on which the asylum is located comprises an area of 270 acres, including about 40 acres of woodland and a mansion, Claybury Hall, built late in the last century, which is now being enlarged and adapted as a private asylum for fifty paying patients.

Part of the estate will form the farm, which will give occupation to many of the patients, and will support the stock for the use of the asylum. Farm buildings for about 400 head of cattle and pigs are shortly to be erected, and the sewage of the institution will be utilised on the farm lands, though provision will be made for diverting the sewage into the public sewer, if necessary.

Illustrations.

ILLUSTRATIONS OF OLD CHESTER.*

VI.—HALL AND STAIRCASE, 24, WATERGATE-BOW, NORTH.

THE history of this interior appears to have been lost, the house being comparatively modern, except the cellars, which are extensive, but of no special interest. The hall and staircase are of oak, and are in good preservation. The upper floor was probably added when the house was rebuilt, the second stair being of more recent date.

Two doors west from this house stands a very large mansion, said to have been the residence of the Grosvenors, now the Liberal Club, and at the end of the Row is the half-timbered "Carnarvon Castle" public-house. Nearly every house contains good Elizabethan examples inside, but only fragments. This may apply to the entire north side of the street, the old houses having been replaced by more convenient ones, having plain (and, in many instances, very commonplace) brick fronts, the work of the speculative builder.

THOMAS P. IVISON.

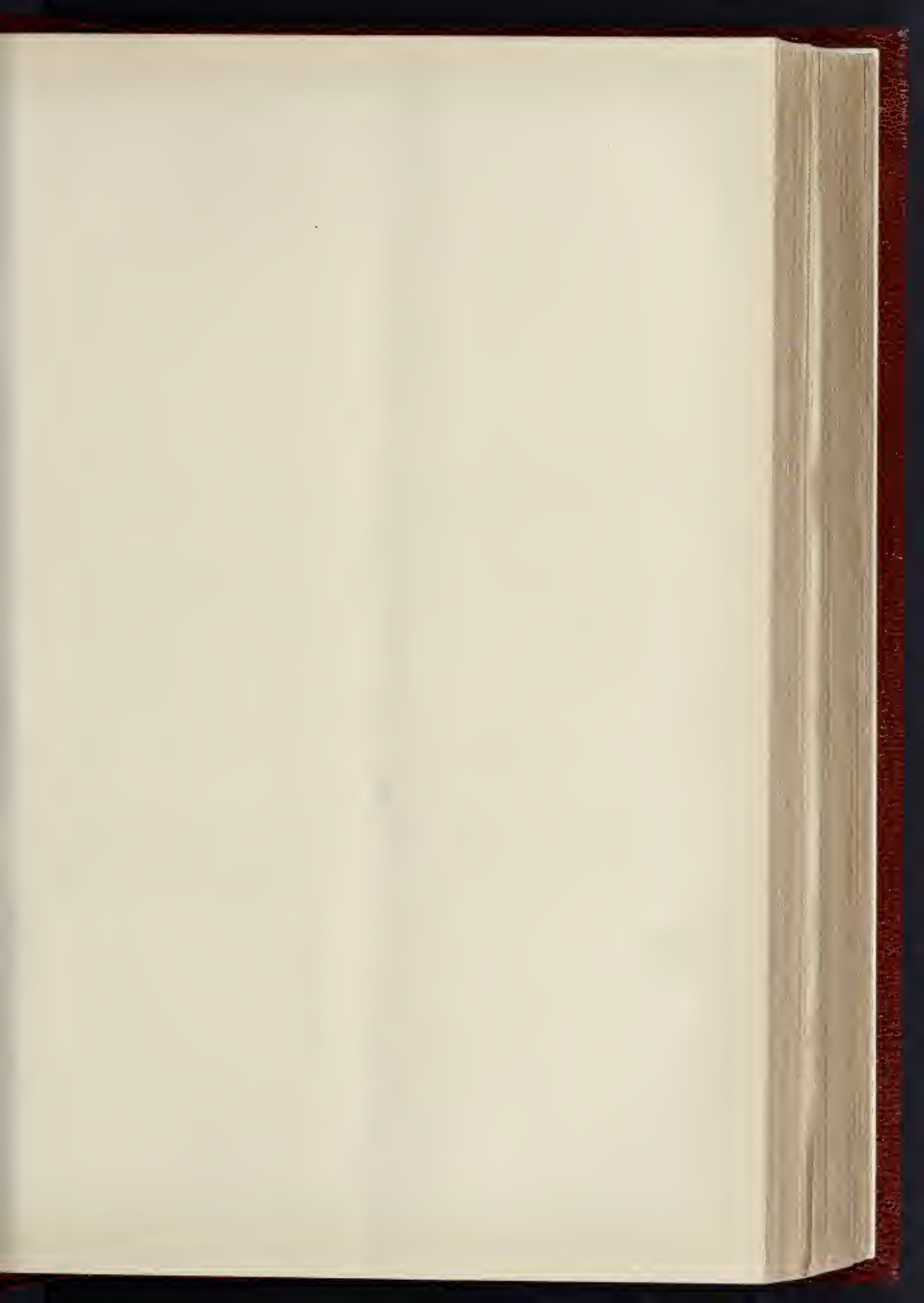
EDINGTON CHURCH.

A FULL description of this church, taken from a paper read by the architect for its restoration, before the Royal Archaeological Institute, at its Salisbury Congress, was given in this journal on August 20, 1887, together with reproduction of the measured drawings. We need, therefore, only now state that in 1852 William Edington (a native of the parish), Bishop of Winchester, founded here a monastery of the Order of Bonhommes on the site of a previously-existing parish church. The present church (which remains nearly intact) served the double use of the chapel of the monastery and the parish church.

The restoration of the church, under the care of Mr. G. E. Ponting, F.S.A., architect, of Marlborough, has been completed, including the repair of the fine rood screen. One of the most interesting features of the work has been the restoration of the parish altar to its original position at the east end of the nave, a position clearly indicated by structural evidences. The ancient level of the floor of the easternmost bay of the nave was found to be 1 ft. 4 in. above that of the remainder, and this has been enclosed on three sides by light oak screens to form the sanctuary and to separate it from the aisles and the space under the tower without shutting out the view of the rood screen beyond. The drawing we reproduce (and which is now exhibited in the Architectural Room of the Royal Academy) shows the parish church as refitted. The central part of the eastern screen forming the roodaisle is solid, and the panels are being painted by Miss Eleanor Warr.

This church is a striking illustration of how completely the ancient plan lends itself to our present requirements. The ordinary services are much more conveniently provided for in the nave than (as was recently the case) by treating the entire church as one, with only one altar, and that at the east end of the long

* For preceding views of this series, see *Builder* for February 6, February 27, March 12, April 9, and May 23 last.





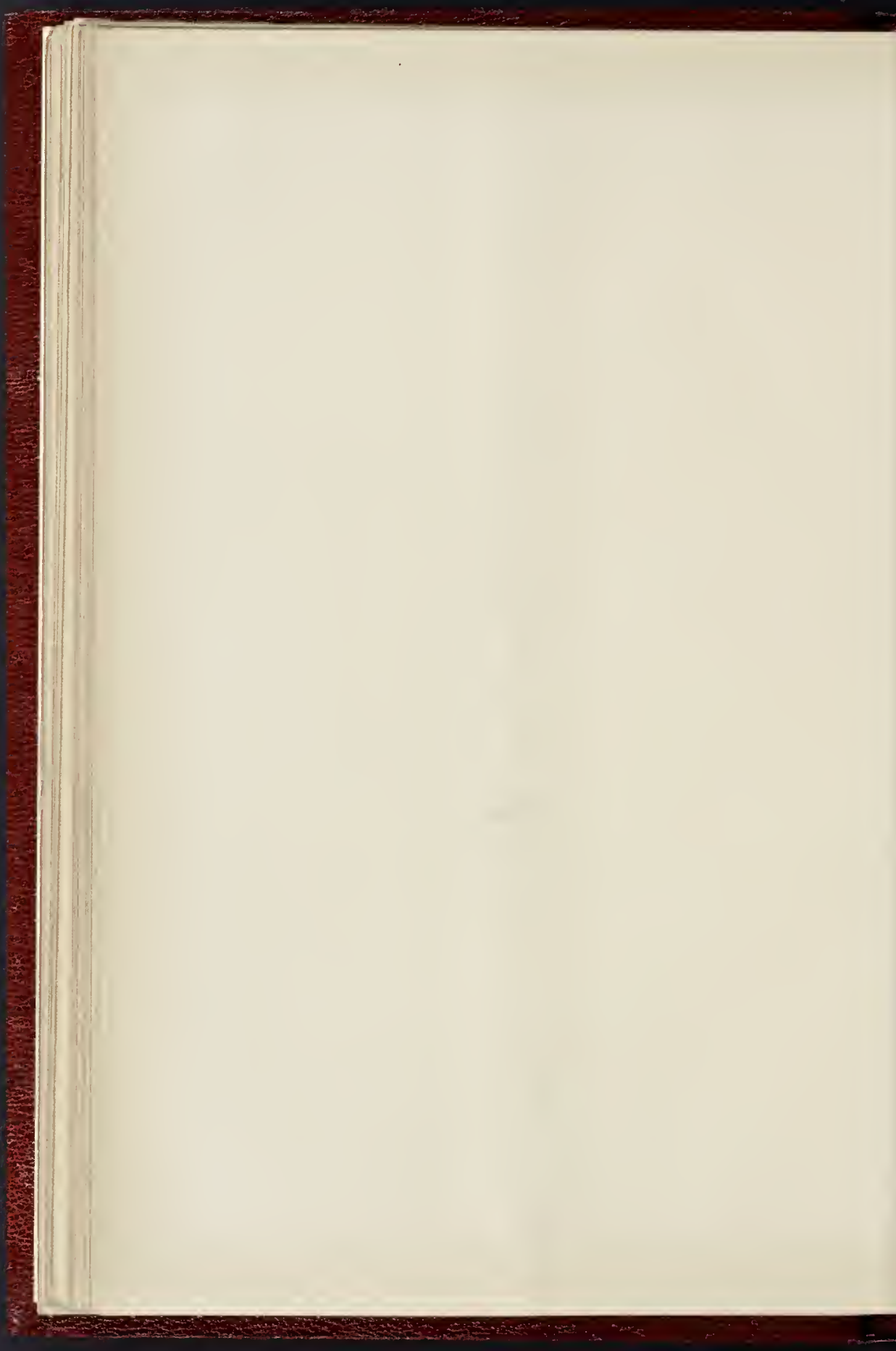
Royal Academy Exhibition, 1892



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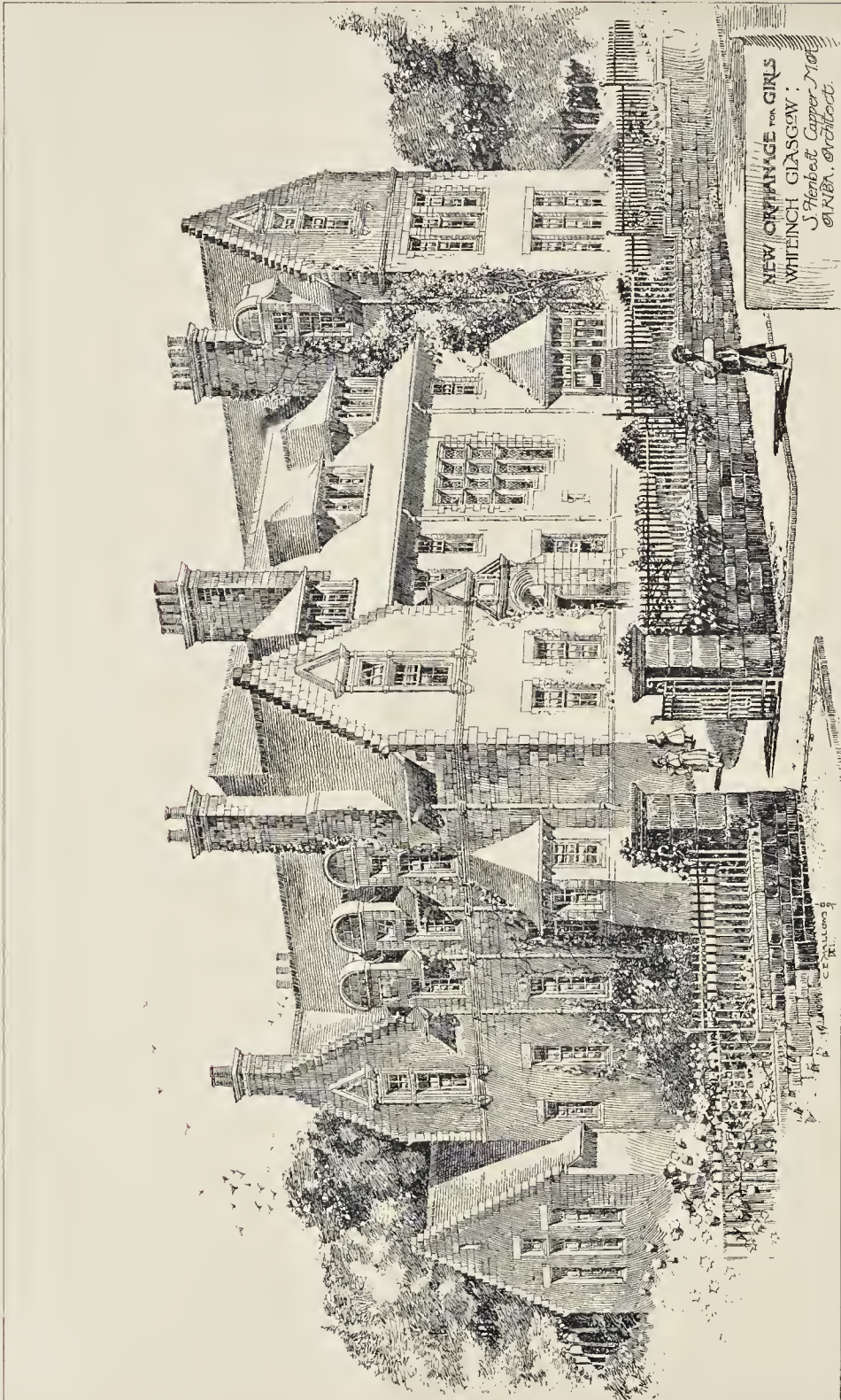
R. A. SMITH, ESQ.

GIBSON & RUSSELL ARCHTS





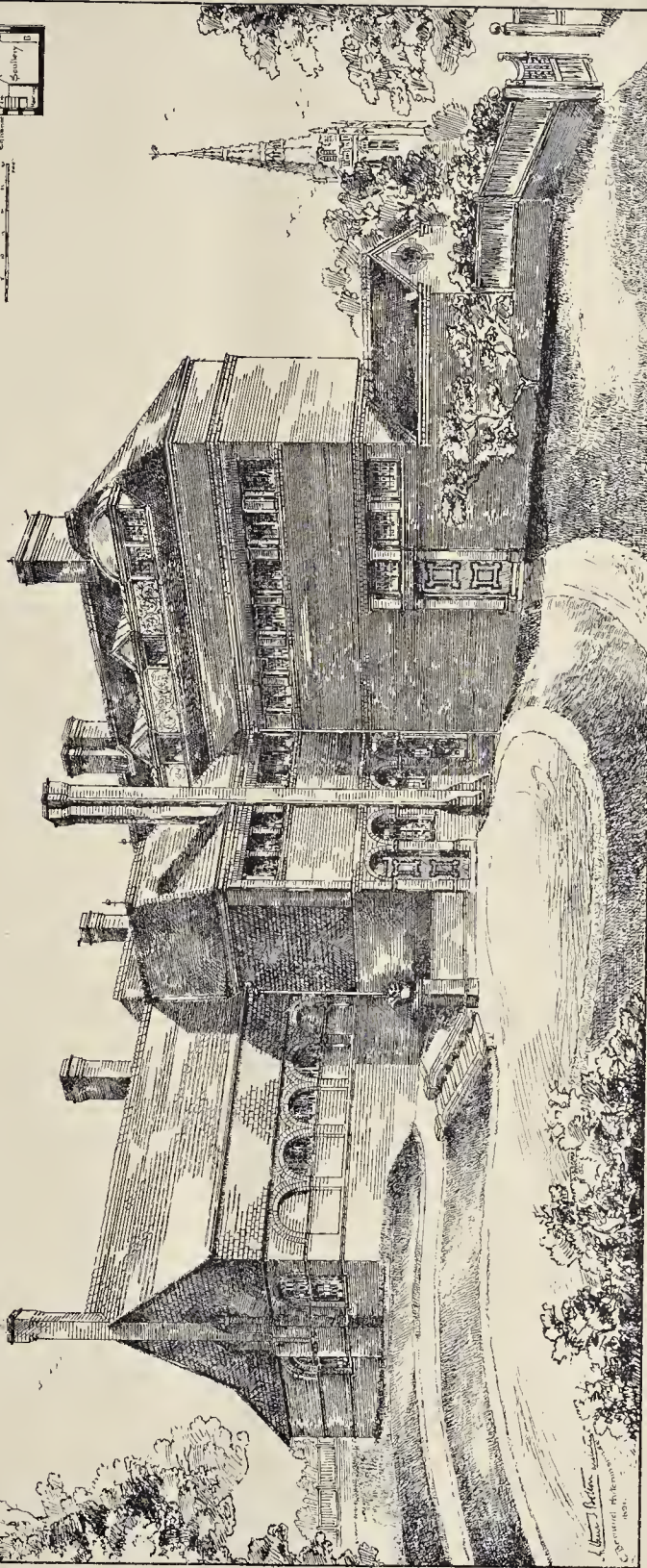
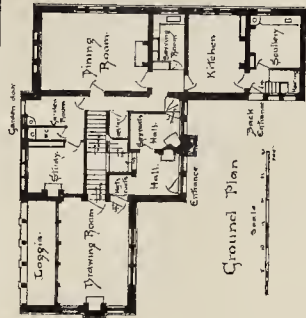
THE BUILDER, JULY 30, 1892.



NEW ORPHANAGE FOR GIRLS
WHITECHURCH GLASGOW:
J. Herbert Copper-Nickel
© RIBA, architect.

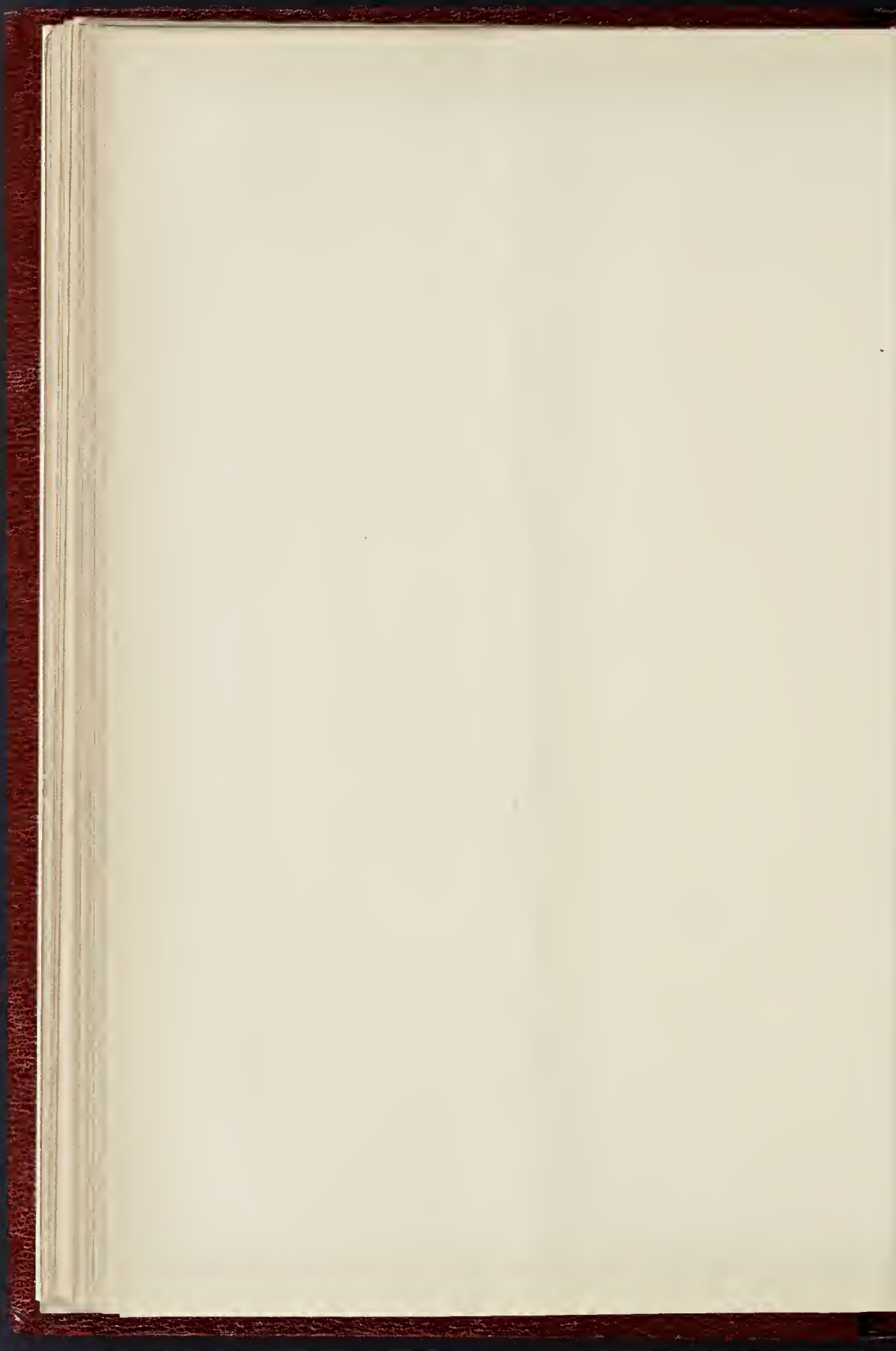
PRINTED AND PUBLISHED BY J. H. COOPER, 15, ABchurch Lane, E.C. 4, LONDON.

HOUSE ON: A. BILL:



DESIGN FOR A HOUSE.—MR. A. T. BOLTON, A.R.I.B.A., ARCHITECT

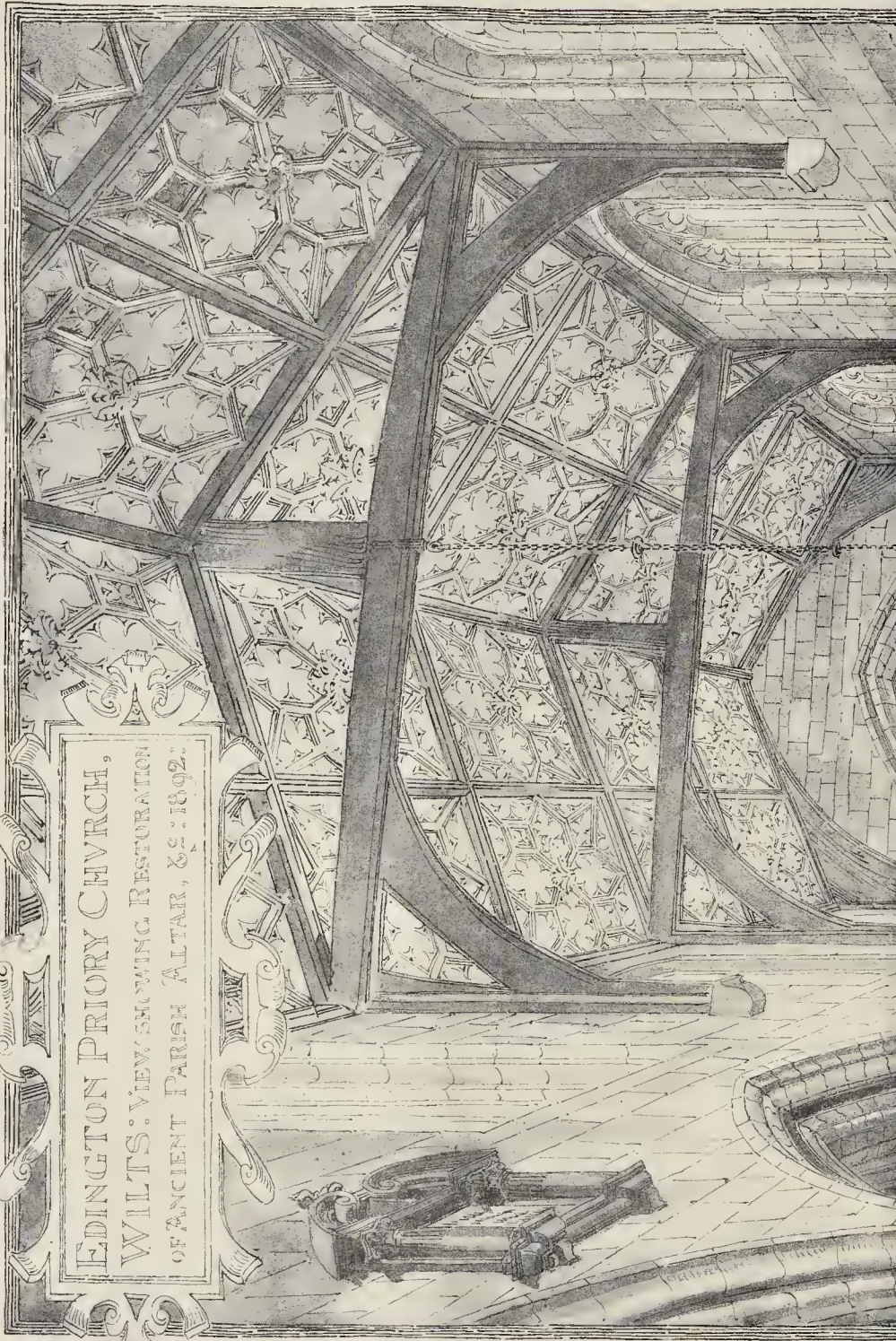
PHOTO LINDO, BRIDGE ROAD, E.C.4. EAST BRIDING STREET, LITTLE LANE, E.C.

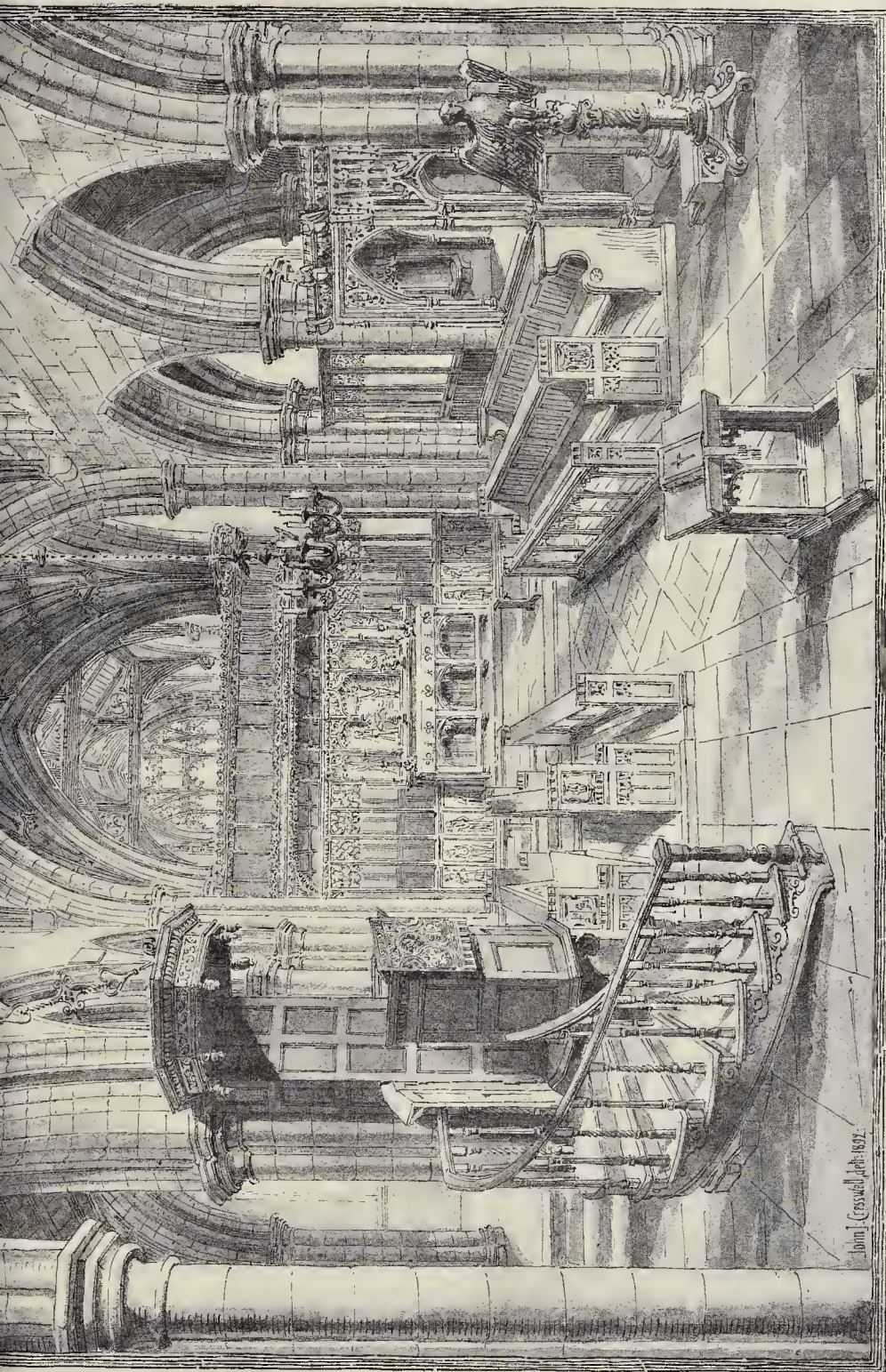




THE BUILDER, JULY 30, 1892.

EDINGTON PRIORY CHURCH,
WILTS: VIEW SHOWING RESTORATION
OF ANCIENT PARISH ALTAR, &c. 1892.

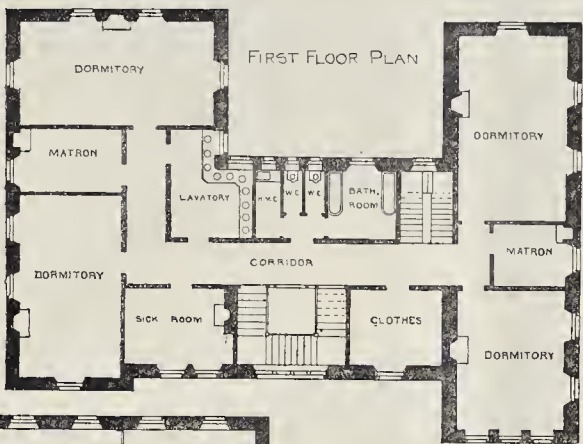




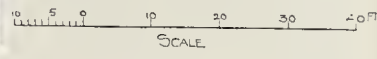
C. E. PONTING, F.S.A., ARCHITECT: 1887-92.

INK PHOTO SPRAGUE & CO. 483 GEP. PRUDING STREET, HETTELN, PAE. E.C.

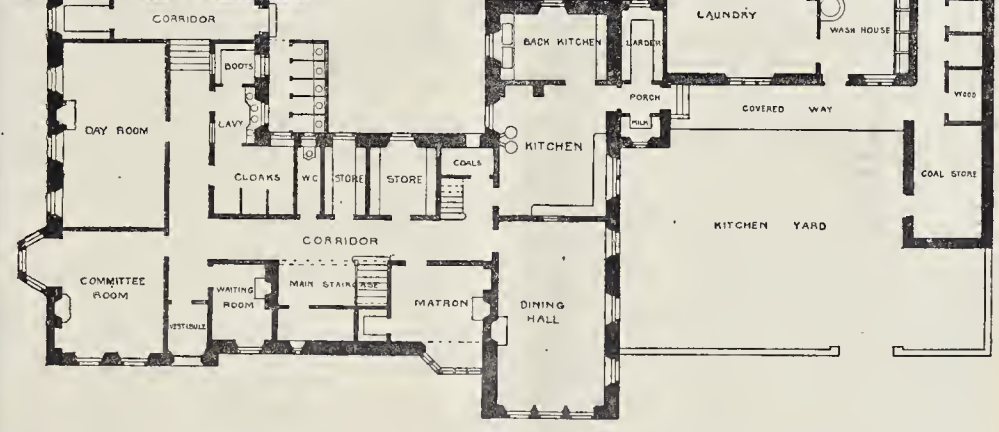
Royal Academy Exhibition, 1892.



NEW ORPHANAGE FOR GIRLS
WHITEINCH:GLASGOW.



GROUND FLOOR PLAN



chancel, from which the voice of the officiating priest was inaudible, whilst the chancel itself (which was the monastic chapel) is most convenient for early celebrations and other services attended by smaller congregations.

The builder who executed the repairs of the church is Mr. James Burgess, of Westbury; and the screen-work was carried out by Mr. N. Mitch, of Vauxhall.

HOUSE NEAR CALNE.

This house was designed for an Australian now resident in this country. An attempt has been made to design the house to harmonise with its surroundings. The "look-out" over the gable commands the best views of the country, and forms a picturesque feature of the design.

The walls are faced with dressed rubble, the dressings to windows, &c., being worked with an axed surface, and the roofs covered with small silver-grey slates. The public rooms will be finished with wood and other panelling. The plans sufficiently explain themselves, and will be carried out almost as shown.

The architects are Messrs. Gibson & Russell, and the drawing is exhibited at the Royal Academy.

NEW ORPHANAGE FOR GIRLS,
WHITEINCH, GLASGOW.

THE new buildings for the "Glasgow Institution for Orphan and Destitute Girls" have recently been erected to supersede by a per-

manent home the temporary premises occupied from time to time by this philanthropic society, which has now been in existence for considerably over half a century. The site, extending to an acre and a half, faces the new Victoria Park in the extreme west of Glasgow. Accommodation is provided for sixty girls in all, who are trained for domestic service. The building has been planned to secure a south-easterly or south-westerly exposure for all the principal rooms, dormitories, and bedrooms, which nearly all command views of the park. On the ground-floor are dining-hall, day-room, and school-rooms for the children (the latter capable of being thrown into one for special occasions), besides committee-room, waiting-room, matron's sitting-room, and stores. The kitchen is behind the dining-hall, for convenience of service, and from it access is obtained to the offices grouped round the kitchen yard. Cloak-room and lavatory accommodation is provided conveniently for both front and back entrances. The girls' closets are outside, advantage being taken of the rapid fall of the ground to place these close to the back entrance, without interfering with lighting or ventilation in any way.

Two staircases are provided to the upper floors. The system of small dormitories has been adopted throughout, - six in all for the sixty girls, grouped in pairs, with a matron's room between, for supervision and control. Over 500 cubic feet have been allowed per child. Separate bath and lavatory accommodation is provided on each floor. The sick-room is on the first floor, commanding the park (it is not intended for infectious cases). Two

or three attic bedrooms are provided for the senior girls.

The style of architecture adopted is Scotch Domestic. Though simple and destitute of ornate work (as befitting its character), the building is carefully studied so as to be homelike and suited to its purpose, and as far as may be from the ordinary square barrack type of charitable institutions. The rubble work is a warm purple-grey from Botwell Park quarry; the dressings, a rich red from Ballochmyle; it is roofed with green Westmoreland slates. Internally the finishings are studiously simple; the scheme of colouring is, however, varied to produce a pleasant sense of brightness and variety for the children; the corridors are lined with warm coloured tiles. Originally designed in partnership by Messrs. Simon & Capper, the work has been executed to amended designs by Mr. S. Henbest Capper, M.A., A.R.I.B.A. - Mr. James Mair was Clerk of Works; the principal contractor was Mr. John Smellie, Junr., of Partick. The total cost was rather under 5,000. The illustration is from a perspective sketch by Mr. C. E. Mallows. S. H. C.

DESIGN FOR A HOUSE.

THIS perspective shows the entrance side of a small house, on a very steep slope, designed entirely in brick and roofed with tiles.

The drawing-room block is of one storey only, and in point of level is only a few steps below the bed-room floor. The staircase widens out on this first floor, level by passages on both

sides, with three arcades at each end, and is lighted from above.

The bed-rooms all look into the garden, the passage being on this side, as may be guessed from the treatment of the windows.

The architect is Mr. A. T. Bolton.

THE LONDON COUNTY COUNCIL.

A SPECIAL meeting of the London County Council was held on Friday, the 22nd inst., at Spring-gardens, the Chairman, Mr. John Hutton, presiding, when the debate, adjourned from the 19th inst., upon the report of the Improvements Committee, was resumed.

The Proposed Street from Holborn to the Strand.—The whole time of the meeting was taken up with the consideration of the scheme for the proposed new street from Holborn to the Strand. In the *Builder* for July 9 we gave the substance of the Committee's report, together with a plan of the proposed street, and we now give the recommendations of the Committee:—

"(a) That the Council do apply in the first session of Parliament in 1893 for powers to construct a new street from Holborn to the Strand, and for widening the Strand and improving Holwell-street, and for the subsidiary street improvements according to the scheme shown in red colour on the plans submitted herewith.

(b) That provision be made for the construction of a subway under the new street (for mains, wires, &c.), and also for the planting of trees in the new thoroughfare.

(c) That provision be made in the Bill that the owners of property benefited shall contribute, and that, with a view to ascertain what special benefits will be conferred by the proposed improvements on the owners of property in the vicinity of them, it be referred to the Improvements and Parliamentary Committees to report jointly to the Council on the frame of the Bill, and that the scheme shown on the plans be approved, subject to these reports.

(d) That it be also referred to the Improvements and Parliamentary Committees to consider and report jointly whether the limits of deviation on the deposited plans should be sufficiently wide to enable the Council to purchase the property comprised in the larger schedule, and also that between Wych-street and Holwell-street.

(e) That it be referred to the Public Health and Housing Committee to consider and report the best mode of re-housing the persons of the labouring class who would be displaced by the construction of the new street and its approaches."

On recommendation a, Mr. W. E. Smith moved the following amendment:—

"That, having regard to the present and exceptional position in which lessees and occupiers in the metropolis, who are under contracts entered into and since 1853 for the payment of rates, will be placed by a charge of rate upon them for the next sixty years for repayment of capital sums raised for street improvements, and which capital sums were never intended to be covered by such covenants, this Council is of opinion that it is inequitable to increase the burden on such lessees by undertaking the proposed street improvement from Holborn to the Strand, and therefore declines to undertake such improvement."

Mr. Smith protested against the Council pledging itself to proceed with any large improvements until the ground landlords had been compelled to bear their share of the cost. They must not suppose that they were going to construct another Northumberland-avenue. If there was any prospect of people laying out money in the new street as they did in Northumberland-avenue the case would be different.

Mr. Arthur Arnold seconded the amendment. He said he felt that whatever decision the Council came to, the matter would end where it began,—on paper. In his opinion, what the Council ought to do was to prepare a Bill stating what alteration in the taxation laws they deemed advisable in regard to improvements. They would then have a definite aim in view, and as soon as the Bill was passed they could proceed with the improvement.

Mr. Frederic Harrison, the Chairman of the Improvements Committee, said that the present scheme did not propose to throw the whole of the cost upon the ratepayers, but only half of the cost. It was proposed that the question of the raising of the other half should be referred to the Improvements Committee and the Parliamentary Committee jointly, and that they should submit a scheme to the Council in October. It was not reasonable for the Council to put its foot down on all improvements until an alteration in the law as to the incidence of taxation had been made by Parliament.

Mr. Fardell said he would not vote for the scheme if the ratepayers were to pay the whole of the cost.

After some further discussion, the amendment was put and lost by a large majority.

Mr. W. Saunders, M.P., then moved as a further amendment:—

"That the Improvements Committee be instructed

to consider the desirability of extending the scheme both north and south before submitting it to Parliament.

He said that in his opinion the scheme ought to be extended in a northerly direction to Eston and King's-cross, and on the south side to the Law Courts. The present scheme provided for a crescent by the Church of St. Mary-le-Strand; but what ought to be done was to remove the church altogether, as well as that of St. Clement Danes. The Committee was proposing a magnificent improvement, which would leave an unsightly church to prevent people outside the improved area seeing into it, and those inside seeing out of it. The architectural effect would be spoilt if the two churches were allowed to remain.*

Mr. Howell Williams seconded the amendment, which, upon being put, was lost by a large majority.

Mr. Lloyd then moved:—

"That, whereas not only a new street is required to be formed from Holborn to the Strand, but the whole area of streets lying between Chesham-street and King's College Hospital needs re-arranging on a comprehensive plan, it is desirable that application be made to Parliament for powers to purchase the freehold of all the land within the lines marked on plan, and that the method to be adopted for conveniently laying out the area thus to be acquired, and the route of the main new street, be deferred for further consideration and report."

Mr. Torr seconded.

Mr. Clarke said that Mr. Lloyd evidently wished to rebuild a large portion of the metropolis, but he could not expect them to seriously discuss a proposal which would cost 20,000,000, or 30,000,000.

The amendment was only supported by six councillors, and was therefore lost.

Lord Monkswell moved as a further amendment to add at the end of recommendation a these words:—

"This scheme shall not be further proceeded with unless satisfactory provisions are made as to the payment for it."

Dr. Collins seconded the amendment, which was ultimately agreed to.

Mr. Campbell proposed a scheme which would utilise the roadway on the west side of Lincoln's-Inn-fields.

Colonel Ford seconded the amendment, which was lost, and the first recommendation of the Committee, as amended, was adopted by 61 to 6.

The second recommendation of the Committee was agreed to without discussion.

On recommendation c, Mr. Beachcroft moved the following amendment:—

"That provision be made in the Bill that the holders of property benefited by improvement shall be liable to such contribution as Parliament may direct, either by such Bill or any Bills passed before the completion of the improvement."

Dr. Forman seconded the amendment, which was lost.

Mr. C. Fleming Williams moved to add the words:—

"And that provision be also made in the Bill for some equitable division of the net cost of the improvement between the owners of ground values in the Administrative County of London and the occupiers thereof, and that in the event of an equitable division being refused by Parliament, the scheme be no further proceeded with."

Mr. Marsland seconded the amendment.

Mr. Charles Harrison, the Vice-Chairman, suggested that the words "in the Bill" be omitted, and that "by Parliament" be substituted.

On a show of hands the amendment as amended was declared carried, and a division was called for, when there voted: For the amendment 63; against, 18.

Recommendation c, as amended, was then agreed to.

On recommendation d, Alderman Beachcroft moved that the following words be added:—

"And whether there would be advantage in the Council seeking power from Parliament to enable the Council to purchase the freehold interest only in such property, and, having purchased the same, to allow the leases affecting the same to run out."

Mr. Westcott seconded the amendment, which was agreed to.

Mr. Costelloe moved, and Dr. Collins seconded the further addition of the following words:—

"And whether power should not be taken with the same Bill to proceed with the widening of Surrey-street and Southampton-row."

* Who is Mr. Saunders, that he is to pronounce on the architectural value of St. Mary's Church? It is an authority on architecture? The assurance with which people of this kind lay down the law on architecture is really something astounding.—En.

This was agreed to, and recommendation d, with the additions, was agreed to.

Recommendation e was agreed to without discussion, and the Council adjourned.

THE usual weekly meeting (the last before the summer recess) was held on Tuesday afternoon last, the Chairman, Mr. John Hutton, presiding.

A Year's Work: Proposed Municipal Buildings.—The Chairman, in accordance with annual custom, gave a review of the past year's work of the Council. His address teemed with matter of great interest and importance, but we regret that we have not space enough left to attempt a résumé of it. In concluding his remarks, he observed that one obligation rested gravely upon the Council—that of erecting suitable municipal buildings in which to discharge the growing duties committed to them.

The initial difficulty of a really suitable site, when disposed of, should be followed immediately by the preparation of plans for their building, and, seeing that they had already Parliamentary power to acquire land for this purpose, the remainder was simply mechanical. It would be difficult to put down in money value the loss which London now sustained by reason of the inconvenient offices in which the staff performed their duties.

They were not actuated by a desire for a magnificent Council chamber, but by the determination that the members of the staff, at whose hands they expected good and efficient service, should work under conditions in which their best services could be secured. The work before them was of immense magnitude, and, although the Council consisted of 137 members, he ventured to think that it could not, without serious inconvenience, be deprived of the painstaking services of any one member.

On the motion of Dr. Collins, it was resolved that the Chairman's address should be printed.

Southern Approach to the Tower Bridge.—Mr. Frederic Harrison brought up a report of the Improvements Committee recommending

"(a) That powers be sought in the first Session of Parliament in 1893 to enable the Council to construct a new street from Tooley-street at its junction with the new approach to the Tower Bridge into Bernonsey New-road, and to widen Bernonsey New-road thence to its junction to the Old Kent-road. (b) That the width of the new street be 60 ft. (c) That it be referred to the Improvements and the Parliamentary Committees jointly to prepare and submit to the Council a scheme for applying to Parliament to provide for the cost of a new street in the manner recommended in this report, so as to throw one moiety of the cost upon owners of property benefited. (d) That it be referred to the Public Health and Housing Committee to consider and report as to the arrangements to be made for rehousing persons of the labouring class to be displaced by the formation of the new street."

After two or three futile amendments on recommendation a in favour of alternative routes, on the motion of Lord Monkswell the following words were added to the recommendation b:— "but that the scheme be not proceeded with unless proper provision is made for the payment of it," and the recommendation as amended was approved.

Recommendation b having also been agreed to, Alderman the Rev. Fleming Williams, on recommendation c, moved the following addition:—

"That provision be made by Parliament for some equitable division of the net cost of the improvement between the owners of ground-values in the Administrative County of London and the occupiers thereof, and that in the event of this principle of equitable division being refused by Parliament the scheme be no further proceeded with."

The recommendation, as amended, was then agreed to.

Vauxhall Bridge.—The consideration of the report of the Bridges Committee, recommending the reconstruction of Vauxhall Bridge, was adjourned until after the recess.

Having discussed a great deal of other business, the Council adjourned, after a seven hours' sitting, until Tuesday, September 27.

BRIXTON PUBLIC BATHS.—We understand that Mr. A. Hessel Tilman's design for these proposed baths was a great deal of other business, the Council adjourned, after a seven hours' sitting, until Tuesday, September 27.

**BUILDERS' BENEVOLENT INSTITUTION:
ANNUAL MEETING.**

The forty-fifth annual meeting of this Institution took place on Thursday, July 21, at the offices, No. 35, Southampton-row, Bloomsbury-square, W.C. Mr. B. E. Nightingale (President) occupied the chair, and amongst those present were Messrs. Thomas Stirling, E. Rider, C. Ansell, and other friends of the charity.

Major Bruton (Secretary) read the report, which stated that an advance in some degree in the income of the Institution would be likely to justify the Committee in advising that no eligible candidate need of necessity be excluded, even for a time, from participating in the anxiously sought-for comforts which the charity bestows upon its recipients. It was satisfactory to observe that, amongst fifty-five pensioners, only two deaths had occurred during the past year, while three others had been elected. In accordance with the will of the late Mr. R. A. Newbon, of Islington, the Institution was entitled to a legacy of 1,000*l.* less duty. This had to be invested in the stock belonging to the Institution in the Bank of England, agreeably to Rule 12, which applied to legacies. The sincere thanks of the Committee were rendered to the President, Mr. B. E. Nightingale, for his energetic and effective appeal for the necessary means to meet the expenditure of the year, for his own liberality, and for the earnest and attentive interest taken by him in the prosperity of the Institution. The Committee had pleasure in announcing that Mr. Joseph Randall (of the firm of Messrs. Kirk & Randall) had accepted the Presidency for the year, and would preside at the annual dinner in the hall of the Worshipful Company of Carpenters, on Thursday, November 3, when it was hoped to have a large and successful gathering.

Mr. Thomas Stirling moved the adoption of the report, which was seconded by Mr. E. Rider, and unanimously agreed to.

Cordial votes of thanks were passed to the President, Vice-Presidents, Trustees, Treasurer, Committee, and Auditors.

The Chairman then proposed that Mr. Joseph Randall be the President for the ensuing year.

Mr. Stirling seconded the motion, which was cordially received.

A vote of thanks was passed to the Chairman for presiding, and a similar compliment was paid to Major Bruton, in recognition of his exertions on behalf of the charity.

The proceedings then terminated.

Books.

Continental Electric Light Central Stations. By KILLINGWORTH HEDGES. London: E. & F. Spon, 1892.

ON the occasion of the visit of the members of the Congress of Municipal Authorities to the Frankfurt Exhibition, the Committee presented each member with a copy of "Die Versorgung von Städten mit Elektrischem Strom," which was "compiled from the reports of the principal German electrical firms and other users of the electric light, to explain the system adopted."

Mr. Hedges has obtained the permission of the contributors to make use of this material, and has so largely availed himself of it that the present volume may almost be regarded as a translation of the German work.

The author in his preface tells us that his object is two-fold: "first, to enable the members of lighting committees, and others taking up the question of the introduction of electricity, to obtain a rapid survey of what has been done abroad, both on a large and small scale; and, secondly, to enable electrical engineers to follow those arrangements for distributing electricity which differ from the usual English practice."

In other words, he addresses himself both to technical and non-technical readers, who have a practical interest in the subject.

The result is what might be expected from an attempt to sit on two stools at once. The engineer passes over with impatience popular descriptions of elementary matters, such as the series system with which he is familiar, while the non-technical reader finds that his ignorance of the elements has been insufficiently allowed for, and that he can scarcely get along, even with the help of the glossary at the end of the book. In this glossary, by the way, Mr. Hedges indulges under considerable and unacknowledged obligation to our contemporary *Lightning*.

Not the least interesting part of this work is the table of contents, which gives not merely a page on which the description of any particular station will be found, but, also in tabular form, many important details, such as output, pressure and motive force, and also a column of

short explanatory notes. The column headed "Motors worked" might, however, almost as well have been omitted, so vague is the information it contains. Indeed, only in the case of the Esslingen Co. is there any real information, viz., "30-h.p. for motors." In other places, we only find an unsatisfactory "large number," "use increasing," "extensively used," or some such expression.

The general plan of the book is as follows:—Part I. deals with high pressure distribution with alternating current and transformers. Part II. with low pressure distribution by continuous current, either direct or with secondary batteries. Part III. with miscellaneous matters, such as a popular explanation of the polyphase system, measuring instruments, tables, laying mains, and the aforesaid explanation of technical terms.

On comparing the total output high and low pressure of all the stations mentioned, we find 136,160 16 c.p. lamps high pressure, against 324,790 low pressure. Allowing for the longer time the low-pressure system has been in vogue, these figures would seem to indicate that the opinions on the continent are nearly equally divided as to the merits of the two systems. In Berlin alone, there is an output on the low-pressure system larger than the whole high-pressure output; but if we exclude Berlin and Hanover, the three largest supply stations mentioned are on the high-pressure system.

The bulk of Mr. Hedges' book consists of brief descriptions of the various installations, useful enough for reference, but no more suitable to be read straight through than a catalogue is. The working drawings, photographs, and sketches, really afford more information than the text, showing, as they do, at a glance the general arrangements; though the value of the reproductions of the photographs is lessened in that they are frequently indistinct. In print, paper, and binding, the book is all that could be desired.

The Principles of Ornament. By JAMES WARD. Edited by GEO. AITCHISON, A.R.A. London: Chapman & Hall, 1892.

THIS is not a second edition, in the usual sense, of the little book which we reviewed in the *Builder* of July 19, 1890; it is a re-issue in a somewhat different form; Professor Aitchison having used Mr. Ward's book as a basis for working up a treatise with considerable additions, somewhat altered in form and arrangement, and with a good many new illustrations. The reason for this arrangement is given in the editor's preface. As examiner on the Principles of Ornament at the Science and Art department, he found there was no good English text-book on the subject; and Mr. Ward's, which had been sent to him, did not meet his approval altogether; but he thought it unfair to try to supplant it by an entirely new text-book after Mr. Ward had been at all this trouble, and therefore consented to edit a new edition.

A great deal of Mr. Ward's original matter is retained, but it has been condensed and improved in literary style, and while most of the original illustrations have been retained, others have been added which are more important and drawn with more finish. An introductory chapter by Professor Aitchison has also been added, giving a general review of the subject of ornament, in the course of which the essential distinction between ornamental design and the mere copying or adapting of natural forms is well given in the following words:—

We have a novel phase of applied ornamentation, which mainly consists in twisting or arranging certain plants into the shape required, making some alteration in them for our purpose and to make them fit their places. Much of this work is flabby or wire-drawn, and often omits the highest beauty of the plants it uses, but even when the beauty of the plant is not left out, the ornament is infinitely below the highest flights of former art, in which the artist had absorbed the graces of floral growth and had properly applied them. The highest ornamental art is, by its abstraction, closely allied to architectural art, while all its higher achievements are in conjunction with architecture; consequently there should be a harmony between the decoration and the framework. Natural foliage arranged on a geometrical basis makes a poor contrast to noble architecture.

This may serve an example of the excellent manner in which things are put in the introductory chapter; and in treating the rest of the book Professor Aitchison has given additional value to the opinions and criticisms of the

original author by putting them into simpler and more logical literary form than before. The book is now a satisfactory and useful educational treatise on ornament.

The Garden of Japan: A Year's Diary of its Flowers. By F. T. PIGGOTT. With Four Pictures by Alfred East, R.I. London and Orpington: George Allen; 1892.

THIS book, which has had the honour (as we suppose Philistines must consider it) of being issued by the country publisher who was alone found worthy to publish the works of Ruskin,* is a most charming little publication *de bono*, beautifully illustrated with chromolithographs and other drawings of Japanese flowers. The author, who has lived for some years in Japan, and come back (as so many residents there do) thoroughly in love with the Japanese country, has written a series of notes on the flowers characteristic of each month in Japan, interspersed with picturesque descriptions of scenery and people, and occasional verses which we take to be Japanese poetic thoughts put into an English dress. The whole is charmingly written, and contains information about Japanese flowers which may be of value in another way, while the volume is a little work of art in itself. What Mr. Piggott says of the Japanese flower worship is characteristic: "Somehow we (in England) seem to take it all for granted; but in Japan the flower, and more especially the first of its kind, is actually greeted with a solemn and becoming reverence. The admiration is active, not passive; it is derived not from a passing glance, but from a steady lingering look ending in one of those soft gurgling sounds which are potential in expression of infinite and complete satisfaction." We cannot help thinking, however, that there are people in this country who can admire and love flowers as passionately as any Japanese, though they may not "gurgle" over them.

The Employers' Liability Act, 1880, with Decisions, Notes, and Explanations. By R. M. MINTON-SENHOUSE, Barrister-at-Law. London: H. Cox, 1892.

THERE is no lack of works on this important Act, but, as is the case with many other legal books, new decisions soon put them out of date, so that a fair reason can generally be found for a new volume on this subject. We cannot say, however, that we are altogether pleased with this book: the law appears to be accurately stated, but the form is unsatisfactory. First of all, we have an introduction mainly concerned with one subject, namely, the doctrine of common employment. Then we have a part headed with the above Act, but which is in fact a précis of the Act, mingled with notes and decisions. After that comes a kind of treatise on the terms, "Workman," "Employer," and "Negligence." Then chapter iv. deals with "Defences" and chapter v. with "Procedure." Chapter vi. is concerned with Lord Campbell's Act; and, finally, we have the Employers' Liability Act itself, with references to the previous pages. There is no doubt that almost all the rest of the book should have formed notes to the Act, and there is equally no doubt that the form of the book is inconvenient. We should have been glad also to have seen the dates of the various decisions stated, so that the chronological progress of the law on the subject could have been followed. On the whole, we have in this book a work not without its uses, but not as good as it might have been.

Secondary Batteries. By J. T. NIBLETT. London: Biggs & Co.

IN this little book the author has collected and clearly described a number of details of a very practical nature concerning a great number of secondary batteries, of all shapes and sizes, many of which are in practical use at the present time. The particulars of weight, size, charging and discharging rates are clearly stated, according to the figures furnished by the various makers, in small tables throughout the book, and due prominence is given to the all important questions of proportion of useful lead, and capacity per unit of weight of plates.

The author gives a great deal of very interesting information regarding the actual

* We observe, by the way, that Mr. Allen is now of London and Orpington." This must be a sad blow to Mr. Ruskin.

methods in use of constructing the various forms of plates which he describes.

The consistent use of the terms "positive and negative" plates all through the book is satisfactory, and all such confusing terms as electro-positive and electro-negative elements are well avoided, possibly the footnote on this subject on page 224, might, with advantage, have appeared somewhat earlier in the book.

The various forms of hydrometers, and accessories in storage battery work are mentioned, and in the appendix some useful tables regarding the densities of various solutions are given, also a variety of simple chemical and electrical notes.

The illustrations are clear, comprehensible, and well reproduced; and the whole book seems to fulfil the purpose for which the author appears to have intended it.

The Student's Column.

CONCRETE.—V.
CEMENTS.

CEMENTS may be defined as finely-ground compounds of lime and other substances which set on the addition of water without any preliminary slaking action. They are sometimes divided into natural and artificial cements, and may be classified thus:—

Natural Cements.—1. Roman, Medina, and similar cements. 2. Plaster of Paris and similar cements.

Artificial Cements.—1. Slag cement. 2. Portland cement.

Certain magnesian limestones furnish hydraulic cements, but it is not necessary to describe them in detail.

NATURAL CEMENTS.

1. *Roman Cement, &c.*—The discovery of natural cement in England is due to Parker, who in 1798 took out a patent for its manufacture. Up to that time, English architects and engineers had relied chiefly on pozzolana from Italy for rendering lime hydraulic, and it was probably for this reason that the name "Roman Cement" was given to the new discovery. The cement was originally obtained by the calcination of nodules, or septaria, found in the London clay, and afterwards of those dredged from the Solent. These contain more clay than the raw stone either of hydraulic lime or Portland cement. The latter contains about 25 per cent. of clay, &c., while Roman cement contains from 25 to 35 or even 40 per cent. Besides the cement more particularly known as "Roman," there are others which are very similar, but which have received different names; such as "Medina Cement," made in the Isle of Wight; "Atkinson's Cement," made at Whitby in Yorkshire; and "Harwich Cement" and "Sheppey Cement," named from the places of their manufacture.

Some of the Carboniferous limestones of Derbyshire, &c., and of the lias limestones of Warwickshire, yield on calcination cements approximating to the Roman cement. Tests of a Rugby lias cement are given in Table II., Chapter III. At Boulogne, in France, a natural cement is found, which, from its similarity, both in composition and action, to Portland cement, has been called "Natural Portland." America, however, is the great home of natural cements, and these cements have received most attention. In England the Roman and kindred cements have been largely superseded by Portland cement, because of the superior strength of the latter and its greater capacity for sand. There are, however, situations in which the natural cements can be used with advantage on account of their quickness of set, but there are Portland cements manufactured now which set almost as quickly as the natural cements.

Into the details of manufacture and composition we do not propose to enter. It will suffice to say that the composition of natural cements, even from the same place, varies considerably, and this, of course, is a disadvantage. They are burnt at a comparatively low temperature, otherwise they would fuse into glassy, useless lumps on account of the iron, &c., which they contain. After calcination, they contain a certain amount of uncombined lime, that is to say, calcium oxide, and also a small quantity of tri-calcium silicate, which is, according to Le Chatelier, the most important ingredient of

Portland cement; the bulk of the cement, however, consists probably of calcium aluminates, and it is this which differentiates them from Portland cement. The cement-stone, after calcination, will not slake on the addition of water, and is therefore ground between millstones; the powder is then packed into barrels or sacks, ready for use, and should be kept thoroughly dry, as it is very liable to deterioration from moisture. The finer the cement is ground the better will it be.

Weight.—The weight of a struck bushel of Roman or Medina cement is about 75 lbs. to 80 lbs., being therefore about 20 lbs. less than the same quantity of Portland cement.

Strength.—In comparison with Portland cement, the strength of the natural cements is only small. "Experiments," published by Mr. Grant in 1880, show the tensile strength of a "Rugby lias cement," which weighed 74 lbs. per struck bushel, and of a Portland cement which weighed 114 lbs. per struck bushel. Both were made into briquettes with various proportions of sand, five briquettes of each kind being kept in air and five in water; and all were tested when twelve months old. The results are given in lbs. per square inch:—

exhibit is the great difference in the strength of mixtures of Roman cement and sand, measured by weight and by volume. The difference with Portland cement is not so striking, because, bulk for bulk, the weight of Portland cement is not much different from that of sand; in this case, the proportion of 1 to 3 by weight was equal to 1 to 2.864 by volume. But with Roman cement the briquettes proportioned by weight, are, on the average, exactly 60 per cent. weaker than those proportioned by volume. This difference is due to the heaviness of the sand in comparison with that of the cement; the briquettes measured by volume contain, therefore, considerably less than those measured by weight. When we consider that in making briquettes, the ingredients are usually proportioned by weight, and in making concrete or mortar by volume, we see how easily an error may be made in calculating the probable strength of a structure. If tests of briquettes made by weight give a certain strength per square inch, and this strength be made the basis of calculation for the strength of concrete made by volume, the result may be disastrous, for the concrete may have less than half the strength which the calculations show it ought to possess.

TABLE VI.
Strength of Natural Cement.

	Weight per Bushel.	Proportions of Cement and Sand by Volume.							
		1 to 3.		1 to 4.		1 to 5.		1 to 6.	
	lbs.	Drv.	Wet.	Drv.	Wet.	Drv.	Wet.	Drv.	Wet.
Rugby lias Cement..	74	78	142	63	110	40	75	20	45
Portland Cement	114	198	216	164	171	144	143	113	124

This table shows at a glance the great difference in strength between the natural cement and the artificial one, and it also exhibits plainly the superior sand-capacity of the latter. The Rugby lias cement mortar (1 to 6) is 70 per cent. weaker than the 1 to 3 mortar, while with Portland cement the difference is only 43 per cent.; or, to put it another way, Portland cement is about twice as strong as the other when both are mixed with three parts of sand, but with six parts of sand it is nearly four times as strong. According to this table, the strength of briquettes kept in water is, at twelve months, considerably in excess of those kept in air. Table VII. shows the strength of other natural cement briquettes, at twenty-eight days, to be less when kept in water than in air.

Professor Dr. Boehme obtained the following results with Roman and Portland cement mixed with sand in the proportion of 1 to 3, some of the briquettes being kept in air and some in water:—

A little arithmetic suffices to reduce the proportion by weight to the proportion by volume, provided that the weights of the cement and sand are known. If cement weighing 75 lbs. per bushel be mixed with sand weighing 100 lbs. per bushel in the proportion of 1 to 3 by weight, we should have 75 lbs. (= 1 bushel) of cement, and 225 lbs. (= 2.25 bushels), of sand, or a proportion of 1 to 2.25 by volume, which would be 20 per cent. stronger than 1 to 3 by volume.

The great strength of Portland cement in comparison with the Roman is also plainly shown. If we take the briquettes proportioned by volume and set in air, these being the conditions usually obtaining in buildings, we find the tensile strength of Portland cement and Roman cement to be as 4 to 1 at seven days and 3 to 1 at twenty-eight days, and the compressive strength as nearly 10 to 1 at seven days and over 5 to 1 at twenty-eight days. These ratios show that the Portland cement, although it sets more slowly than the other, attains a greater

TABLE VII.
Strength of Roman and Portland Cements.

Roman Cement.	Sand.	Measured by.	Kept in.	Strength in lbs. per sq. in.				Ratio between Tension and Compression.	
				Tensile.		Compressive.		7 days.	28 days.
				7 days.	28 days.	7 days.	28 days.		
1	3	weight	water	40.5	127.5	300	882	1/7.4	1/7.3
"	"	"	air	111.5	200	530	[114.9 A]	1/3.8	1/5.625B
"	"	volume	water	18.5	54.1	123	322	1/6.7	1/5.0
"	"	"	air	58.2	[94.0 C]	173	488	1/3	1/5.747D
Portland Cement.									
1	3	weight	water	211	273	1,735	2,690	1/8.3	1/9.8
"	"	"	air	237	304	1,850	2,800	1/7.9	1/9.3
"	"	volume	water	293	265	1,635	2,400	1/7.6	1/9.4
"	"	"	air	223	278	1,715	2,670	1/7.5	1/9.6

These figures are taken from the *Proceedings* of the Institute of Civil Engineers, vol. clix. (1890-1), part 1. The result marked A,—114.9 lbs.—is evidently wrong; perhaps the decimal point ought not to have appeared, making the result 1149 lbs., in which case the ratio between tension and compression, marked B, ought to have been 1/7.4; assuming, however, the ratio, 1/7.3, to be correct, the result A ought to read 1125 lbs. Again, the tensile strength of 94.0 lbs. is evidently an error; if 94 lbs. be meant, as probably it is, the ratio will be 1/9.1 instead of that marked D, 1/5.76.

One important point which these tests

proportion of its ultimate strength at seven days, than does the Roman. Some interesting experiments with Portland cements and natural American cements were made by Prof. E. J. De Smedt (of Washington, U.S.A.), showing their gradual increase of strength from one day to twelve months; at ten days the Portland cements were about one-half the strength they attained at twelve months, and the natural cements about one-third.

The adhesive strength of natural cement is only about one-half that of good Portland cement, both tested neat; and the advantage of Portland cement increases with increasing quantities of sand.

Cubes of Portland cement concrete have a

resistance to compression more than six times that of cubes made with natural cement.

In fact, so great are the advantages of Portland cement that it has almost ousted the other from the market. One reason why the natural cements continue in use is that they set in a few minutes, and can, therefore, be used in running water, where a slow-setting cement would probably be washed away before it had had time to set. Such cements are also useful for bedding floor-tiles upon, and for other purposes where rapid setting is a necessity. This rapidity of setting, however, renders the cement difficult to use, and, in the hands of careless workmen, causes bad results. Only a little should be mixed at a time, and that must be used immediately.

Correspondence.

To the Editor of THE BUILDER.

COMPOSITION OF ANCIENT MORTAR.

SIR,—I have waited to see if the letter of Mr. T. E. Knightley, in your issue of July 2, would be followed by others, in order that any comments on my paper in the *Builder* of June 18 might be answered all together. At present, however, I have only to thank the above-named gentleman for the complimentary manner in which he has written of my paper on "Ancient Mortar." I would take the opportunity of asking Mr. Knightley if he would explain more fully and with the aid of chemical analysis what he means by the "impalpable earthy matter which affects crystallisation," and which, he says, is associated with the sand taken from the gravel in the Thames Valley. Clean, sharp sand, as generally used for mortar, does not contain matter likely to affect crystallisation. Indeed, the action of crystalline sand is purely mechanical, making the mortar more porous, and providing a larger surface for subsequent contraction of the lime compounds, and so preventing cracking.

Gelatinous silica (sometimes termed soluble silica, from the fact that it is readily soluble in a solution of soda or potash) does, on the other hand, exert an important influence in the crystallisation of lime and alumina; indeed, it is the active agent in cement and hydraulic lime of the lime has formation. Consequently, in my paper special attention has been directed to the separate determination of such gelatinous silica as distinguished from ordinary quartz sand. Does Mr. Knightley refer to this kind of silica, or to ordinary clay in its natural unburned condition?

Oxide of iron and alumina being practically insoluble in water, whereas lime is soluble to the extent of one part in 750 parts of water, any rottenness in the mortar would more probably be due to the quality of the lime than to that of the sand; at least, that is the view which, in the absence of fuller information, presents itself to my mind as being the probable explanation of the inferior mortar referred to by Mr. Knightley. As most of the lime used in the neighbourhood of London is derived from the chalk formation, and is, therefore, poor in the gelatinous form of silica I have alluded to, it is quite natural that the surface of buildings erected with lime of that quality should soon become affected by the action of rain-water highly charged with carbonic acid derived from the smoke of a large city.

JOHN HUGHES.

"THE EXAMINATION IN ARCHITECTURE (?)"

SIR,—If Mr. Nevill would hint *in cog.* once for the Examination, perhaps he would appreciate the moral iniquity attached to the above expression.

If, as he says, the Institute does not see its way to judge the tests which itself sets in pure Architecture, let it be consistent and say so, and act thereon by eliminating every vestige of art-learn in the shape of history, biography, features, and, above all, the delusion of design.

The outcome of this would be that the qualification would be rightly, and what it always has been, not an artistic one.

This would result in a purely utilitarian examination in "Building Construction and Practice," which is absolutely essential for both the public and professional weal; there would thus be a distinct gain of time for the extension of other more important matters by the decision of the purely architectural sections.

This may meet the diploma difficulty, which some of the "Memorialists" view with such hate and horror, and would safely justify the employment of any practitioners so qualified, without the fallacious delusion which accompanies the objectionable expression "Examination in Architecture."

WILLIAM A. PITE.

5, Bloomsbury-square, July 26, 1892.

FIRE-PROOF ROOMS.

SIR,—I have recently inspected some fire-proof strong-rooms in the City, and find that in most instances gas is used for illuminating the interiors of such rooms.

Will you allow me to point out the great risk that is thus run in cases of gas explosion, &c.

Owners of such strong-rooms guard against the enemy, fire, from without, while within there is a worse danger.

JAMES JORY.

CEMETERIES.

SIR,—Can any of your readers tell me if there is any work published on the laying-out of a cemetery and the general duties of the Surveyor to a Burial Board? NECRO.

OBITUARY.

Mr. H. G. AUSTIN, F.R.I.B.A.—The *Times* of Tuesday last announces the death of Mr. H. G. Austin, which occurred at his residence in the Cathedral precincts, Canterbury, on Monday, in the sixty-third year of his age. The care of the fabric of the Cathedral has been in the hands of the late Mr. H. G. Austin, and his father, Mr. G. Austin, for about eighty years. In 1848 Mr. Austin succeeded his father as Architect and Surveyor to the Dean and Chapter, and he held the position until his retirement some three years since. Under his supervision many extensive works were carried out. Sixteen or seventeen years ago he restored the roof of the nave and re-faced the clock tower, in the niches of which new figures were placed.

GENERAL BUILDING NEWS.

NEW WORKHOUSE FOR THE PARISH OF ST. GILES, CAMBERWELL, AT EAST DULWICH.—This workhouse, of which the foundation-stone was laid on the 21st inst., is for 1,000 inmates, comprising aged, infirm, imbeciles, and a few lunatics. Provision is also made for sixteen beds in two lying-in wards. The workhouse is designed upon the pavilion system, the Administrative Block being in the centre, and the male and female pavilions on opposite sides. Provision is made for two classes of aged inmates, —viz., those in health, and those who, by reason of their feebleness, occupy their dormitories both by day and by night. Many of the latter are chronically bed-ridden. The estimated cost of the whole of the buildings, including the engineers' works and fittings of every kind, is 70,000. We understand that the whole of the drainage has been executed with Doulton's London stoneware pipes, fitted with their patent self-adjusting joint. Each length of drain, previous to being covered in, has been subjected to the water-test, and approved. The architect is Mr. Thomas W. Aldwinckle, and the builders are Messrs. F. & H. F. Higgs.

NEW INVERLOCHY CASTLE, INVERNESS.—According to the *Dundee Advertiser*, the modern Castle of Inverloch is about a mile and a-half from the ruins of the Old Castle, and is situated almost at the base of Ben Nevis. About eighteen months ago the late Lord Abinger determined to enlarge and remodel the Castle, which extensive improvements are almost fully carried out. The earlier part of this edifice was built in 1836, from designs by Mr. Hesketh, of London, and comprises about one-third of the Castle as now completed. The present addition is from designs by Mr. J. Macvicar Anderson, architect, London, and is partly in the Scottish Baronial style. The stone used in the building is grey granite, obtained on the estate, and the white freestone dressings and copings are from Giffnock Quarries, near Glasgow. The chief feature of the new addition is a massive square battlemented tower, 30 ft. by 30 ft., rising to a height of 65 ft. above the basement, and surmounted on two corners with square turrets. On the south it is flanked with a 12-ft. octagon turret or clock-tower, rising from the basement to a height of 80 ft. After leaving the roof of the main tower the turret comes slightly out above a moulded cornice, and is surmounted by a battlement coping. The windows in the main tower have partly segmental and partly Gothic arches. To the south front are two bay windows, the one from the hall being 20 ft. across, and the other 18 ft. They are executed in white freestone, interlaced with granite ashlars, being finished on the top with battlement coping in granite and freestone. Above each window on the main wall a stepped and pointed gable is carried up. The porch entrance is a pointed Gothic archway, and finished in the inside with rustic granite

ashlar. The principal feature of the north-west elevation is a tower, 20 ft. square, surmounted with battlement and turret on angle. A bay window also projects from the kitchen and billiard-room wall, carried up and finished on the top with spaced copings. A crow-stepped gable runs up on the main wall. In the interior, the basement contains servants' hall, 25 ft. square, brushing-room, dairy, heating-chamber, &c. The whole of the main tower is taken up with servants' accommodation. The other tower contains bed and bath rooms, with a studio on the attic floor for painting. Passing through the porch entrance, to the right are lavatories, the walls of which are lined with white enamelled tiles, and the floors are finished with encaustic tiles. To the left is Lord Abinger's studio, which is finished in Columbia pine, and having a solid floor executed in pitch-pine blocks, and the attic floor is also drawing and dining rooms and library. Over the basement floor are kitchen, scullery, butler's pantry, larders, &c. The chief feature internally of the new addition is the hall, which is nearly 40 ft. square. It is 25 ft. high, and the finishings are in wainscot. The floor was first laid with red pine, then overlaid with fine oak parquet. The grand staircase is executed in oak, with balusters of a trussed and fluted pattern, and moulded and carved pedestals. On the landing of the bedroom floor there is a gallery or promenade, with a balustrade protection, overlooking the hall. On this floor there is a billiard-room, 26 ft. by 20 ft., lighted by bay windows and overhead lantern. The floor is laid with pitch-pine blocks, and arched under on iron beams. The finishing of this room is also in Columbia pine. The remainder of the third and attic floor contains bedrooms, dressing-rooms, lavatories, and bath-rooms. With regard to the ventilation and heating, coils of pipes with ornamental covers are placed in the principal rooms, corridors, and passages. The whole building is lighted by electricity, which work has been carried out by Mr. Yorke, London. The surveyors of the addition to the castle are Messrs. S. J. Thacker & Son, London; while the sole contractors for the work are D. & J. Milligan, building contractors, Ayr, under whom the internal plumber work has been done by the North British Plumbing Company, London; heating, G. N. Haden, London; outside plumber and slater work, M'Ilwraith, Cowan, & Co., Ayr; plaster, J. Annan, London; painting and decorations, J. B. Bennett & Son, Glasgow.

SCHOOL BUILDINGS, CARLISLE.—On the 25th inst. the new Brook-street Boys' School, Carlisle, which has been erected by the Carlisle School Board at a cost of about 3,500, was opened. The new school has been built to match the infants' department which was opened last October. The area covered is over 40,000 square feet, of which the boys' department occupies 5,550 square feet, the infants' 3,000 square feet, and the girls' department, to be added at some future date, will occupy 5,772 square feet, leaving over 8,000 square feet for the boys' playground and covered play-shed, and the remainder for girls and infants. Plans for the girls' department have already been prepared, and show the provision of a cookery-class room for fifty pupils. The large room of the boys' school, which is 85 ft. by 20 ft., and which is divisible into two, will accommodate 148 scholars, and there are class-rooms at either end with accommodation for sixty each. A master's room, with bay window, overlooks the playground, and the heating, lighting, ventilating, lavatory, and drainage arrangements have had special attention. The contractors who have carried out the plans of Mr. Scott were:—Builder, Mr. J. Laing; joiner, Mr. Lattimer; slater, Mr. Nanson; plumbers, Messrs. D. Thomson & Sons; plasterers, &c., Messrs. R. M. Ormerod & Son; painter and glazier, Mr. Ballantine. The heating apparatus and furniture were supplied by Manchester firms.

NEW CHURCH FOR EDINBURGH.—At the Edinburgh Dean of Guild Court, on the 21st inst., a warrant was granted to the trustees of the Merchiston United Presbyterian Church to erect a new church at Polwarth Gardens. The site of the new building is immediately to the east of the hall in which the congregation at present worships, and, after the completion of the new structure, this building will serve as the church hall, for which purpose it was originally intended. The building will be in the Late Gothic style. Accommodation is provided for 600 in the area, and for 265 in the gallery. Mr. David Robertson, of Edinburgh, is the architect.

PUBLIC BATHS, ISLINGTON.—On the 26th inst. the Lady Mayoress inaugurated the new baths and washhouses which have been erected in the Horsney-road for the convenience of the inhabitants of the northern and eastern portions of the parish. The present establishment is the second of three it is intended to provide for the use of the people of Islington. The building covers, with the quadrangle in front, a little over an acre, and contains the following accommodation:—Two large swimming-baths for men, one 132 ft. by 40 ft., and the other 100 ft. by 35 ft. (water measurement); one swimming-bath for women, 75 ft. by 25 ft.; seventy-four private baths for men, and thirty-four for women; forty-nine washing compartments and drying-closets; together with ironing-room, bonnet-

room, and wringers, the whole being ventilated by a fan worked by machinery, a large establishment of laundry, separate residences for the superintendent and fireman, and for the engineer, and an engine-house containing all necessary machinery for the baths and for developing electric power for lighting 332 incandescent lights and two arc-lights. The cost of the building, machinery, &c., has not exceeded 32,000*l.* The architect is Mr. A. H. Telford, and Messrs. Macfarlane & Co. are the builders.

WESLEYAN CHAPEL AND SCHOOLS AT BERRY BROW, YORKSHIRE.—On the 23rd inst. four corner stones of a new chapel and schools for the Wesleyan Methodists of Berry Brow were laid. The chapel is to accommodate 450 persons, and the school 400 scholars, and the estimated cost is about 3,600*l.* The style adopted is of the English Renaissance, and the buildings are being erected from the designs of Mr. E. W. Lockwood, Huddersfield.

NEW FREE LIBRARY, SHOREDITCH.—The work of converting the building in Kingsland-road, Shoreditch, formerly occupied by a Gas Company, into a public library, is being proceeded with, and it is expected that the work will be completed by the end of next month. The old Board-room on the first floor has been converted into a reference library, 30 ft. by 25 ft., with coved and panelled ceiling and parquet floor, and is fitted with book-shelves of pitch-pine. At the rear of this room is a lending library, 25 ft. by 25 ft. The ground floor is taken up by the hall and lobby, which is fitted with mosaic, and the news-room, in the front portion of the building. To the rear of the news-room is the magazine department, and the librarian's-room is situated close by. The building is heated throughout with hot water, and lighted with gas. The architect is Mr. R. J. Lovell, of Queen Victoria-street, and the builder is Mr. J. Ivory, of Great Cambridge-street, Hackney-road.

SANITARY AND ENGINEERING NEWS.

PUBLIC HEALTH (LONDON) ACT, 1891.—We are informed that the Local Government Board have approved the Sanitary Institute as a body whose Certificate that a person has by examination shown himself competent for the office of Sanitary Inspector, under the Public Health (London) Act, 1891, shall be sufficient for the purpose of the requirements in section 108(d) of that Act.

LOUGHBOROUGH SEWAGE DISPOSAL.—A Local Government Board Inquiry was held at Loughborough Town-hall on Wednesday, the 13th inst., by Mr. Rienzi Walton, M.Inst.C.E., to consider an application from the Loughborough Town Council for sanction to a loan of 20,000*l.* for sewage disposal purposes. Mr. A. W. Cross, A.M.I.C.E., Borough Surveyor, explained the plans which have been prepared by him. It was proposed to construct an iron pipe intercepting sewer, to collect the sewage from the three present outfalls, and deliver it at the disposal site, where it will be raised a lift of about 20 ft. by centrifugal pumps. Destructors will be erected at the disposal site to destroy the dry ash refuse from the town, the liquid being utilised to generate steam for pumping the sewage. The sewage would be purified by chemical precipitation in tanks on the constant-flow principle, followed by land filtration through 33 acres of suitable land. The mud will be air-dried and mixed with midden refuse and sold to neighbouring farmers. Mr. W. H. Ralford, C.E., Nottingham, as Consulting Engineer to the Corporation, gave evidence in support of the scheme.

FOREIGN AND COLONIAL.

FRANCE.—The Académie des Beaux-Arts will elect a successor to M. Bonnatieux, the sculptor, to-day, July 30. The committee charged with the preparation of the list of candidates, after having at once laid aside the application of Madame Léon Berteaux, has appointed in the first line M. Frémiet, who appears to have received the greatest number of votes. M. Allar is in the second, M. Marquet in the third, M. Coutan in the fourth, and M. Janson in the fifth line. The Minister of Public Instruction has just appointed M. Tréfont as to take part in the superior Council of the École des Beaux-Arts in place of M. Bonnatieux. It is announced that the Government of the City of Paris have decided not to send any paintings or sculptures, acquired at the recent Salons, to the Chicago Exhibition, on account of the great risks of the voyage. The purchases are very soon going to make some freezing works for the slaughter-houses of the Vilette, for the use of the troops, the expenses, amounting to 650,000 frs., are to be paid by the State and by the City of Paris. A fresco painting by MM. Paul Buffet and Waldmeir is soon to be inaugurated in the little church of the town of Arvey, celebrated by the paintings of Corot. This fresco, which is in the form of a cupola, represents a procession of the relics of St. Nicolas. Next month the new bridge will be opened which crosses the Seine between the parishes of Ivry and Charenton. The first stone was laid in 1890. This bridge, called the "Pont de Confians," measures

170 metres in length, and 12 metres in width. It has three arches, resting on two piles and two abutments. The total cost has been 1,040,000 frs.

—On account of the cholera epidemic in the north-east suburbs of Paris, there is a question of entirely covering in all the canal works on the (almost) island of Gennévilliers. On the other hand, many of the inhabitants of the suburbs desire to have new canal works, with a fall to the sea. —On the St. James'-road at Tallevaux (Charente Inférieure) a commemorative tablet in marble has been erected to the victory of Saint Louis. —M. le Docteur J. A. Martin, to whom we owe several important sanitary works, and who has organised the Hygienic Exhibitions, particularly the French department of the London Exhibition, has just been nominated Inspector-General of the Service de la Salubrité of the City of Paris. —The statue of Admiral Mouchev, who has recently died, will be erected on the Place de la Nature at Havre. —A committee is being formed for the erection of a statue to General Lavoyette, at Castelnaud (Lot). During the African war he distinguished himself by the defence of Sidi-Brabim. —In the Church of Folgoët (Finistère) an altar ornamented with bas-reliefs is shortly to be erected. The carvings are to represent the life and works of Mgr. Freppel, Bishop of Anger, who died in 1881. —A subscription has just been opened for the erection of a statue to General Marbot. It is to be placed at Tulle (Corrèze). —The restoration of the choir arches in the Cathedral at Rouen is being carried out at the expense of the State under the direction of M. Sauvageot, architect of the Department of the Seine. —The competition for the proclamation of the Republic in 1792, the City of Paris is going to organise a great procession on September 22. The procession will recall most of the principal features of the first Revolution.

BERLIN.—The following artists have received "large" gold medals for exhibits in the Salon:—Francisco de Pradilla (Madrid), Julian Falst (Berlin), both painters, and the sculptor, Professor Schilling (Dresden). Four painters and two sculptors of German nationality received "small" gold medals. Among the many artists who received "honourable mentions" are Messrs. Lambert & Stahl, of Stuttgart, and Messrs. Zaar & Vahl, of Berlin, architectural firms of some repute. The Emperor awards the medals after having heard the recommendations of the jury, but he does not always follow their advice. The exhibition is to be closed on the 31st inst. to make room for the "Arts and Crafts" exhibition. —Dr. Meylebauer, who has charge of the Royal "Photogrammetrische Anstalt," has received a gold medal for distinguishing himself as a soldier in the archaeological monuments in the country are being photographed under his superintendence, and then drawn in black and white according to his system. —After the great activity in the building trades during the last decade, it is not surprising to hear of a serious depression in the number of German towns in which building commenced in 1891 was only 1,685, whilst in 1890 the figure was 1,993. About 50,000*l.* of money less was spent in wages (according to the *Deutsche Bauzeitung*). —The question of erecting a second Opera House has at last been settled. The site has been bought, the funds raised, and the work is to be commenced next year. The site selected is near the Friedrichstrasse station. —The two Court theatres will cost a deal of money for alterations this summer. The total estimate is 44,000*l.*, of which 25,000*l.* have been voted by the Government as owner of the buildings, and the rest given by the Crown as leases. The protection of the public against risk of fire is the object of much of the outlay; new staircases in one of the buildings will alone cost 10,000*l.*

MISCELLANEOUS.

PROPOSED PRESENTATION TO SIR GEORGE BUCHANAN, F.R.S.—A movement is on foot for making a presentation to Sir George Buchanan, F.R.S., who has lately resigned the post of Medical Officer of the Local Government Board. A committee has been formed with a view to enabling those interested in public health throughout the country to give expression to the high estimation in which they hold the important work which Sir George Buchanan has done, and for affording some opportunity for the recognition of his conspicuous services in the cause of Preventive Medicine. It has been decided to open a subscription list (not to exceed two in pounds from each contributor) with a view to presenting to Sir George some permanent memento of the esteem in which he and his work are held. Dr. J. S. Bristowe is the Hon. Treasurer of the Fund, and the Hon. Secs. are Dr. W. H. Hamer, 69, Dartmouth Park-hill, London, N.W., and Dr. J. C. Thresh, Chelmsford, Essex, to whom contributions may be sent.

ENGLISH OAK: HIGH PRICES.—Messrs. Richardson (of Stamford) conducted a sale of oak in Bury Park, on the 21st inst., when the following prices were realised:—Trees made 81*l.*, 80*l.*, 72*l.*, 66*l.*, 64*l.*; two, each 61*l.*, 59*l.*, 44*l.*, 32*l.*, 26*l.*, 24*l.*, and twelve more trees averaged 22*l.* each. Amongst the above, one brown oak, containing 104*l.*, made 8*l.*

ELECTRIC LIGHTING.—The Vestry of St. Mary, Islington, held a special meeting on July 22, to consider a report from Professor Henry Robinson with reference to the electric lighting of their district, and it was unanimously resolved to apply for a Provisional Order under the Electric Lighting Acts.

CONSERVATORY COURT OF LONDON.—Dr. Tristram, Q.C., Chancellor of the diocese, has granted a faculty authorising the removal to Ilford cemetery of any human remains that may be found upon the clearing of the site of old Farringdon Market. The market was sold in March last for 98,004*l.* to the new owner, Mr. J. H. Tabbs. Within its area, at the north-west corner, by the site of the former workhouse in Shoe-lane, lies what had been the paupers' burial ground of St. Andrew's, Holborn, wherein Chatterton was buried. He died on August 24, 1770, at a house on the western side of Brook-street, Holborn-bars, that was pulled down in 1851.

THE PRESERVATION OF STONE.—M. Grimaud gives in the *Revue Pratique des Travaux Publics* some formulae for coatings which will preserve stone. He states that oxide of zinc dissolved in a solution of the chloride has for a long time been used as a paint, and it is proposed as a basis for the following cement-stone, 20 kilograms; pulverised Lorraine cement-stone, 20 kilograms; sandstone, 10 kilograms. This cement must be tempered by a liquid composed of hydrochloric acid (22 deg. B), 10 litres; water, 5 litres; zinc, 3 kilograms; ammonium chloride, 0.5 kilograms. (3) A mixture of oxide of zinc, 10 kilograms; pulverised Lorraine cement-stone, 20 kilograms; sandstone, 5 kilograms; and yellow ochre, 0.4 kilograms. This cement is tempered with the solution just given, diluted with 5 litres of water. (4) For soft stone, 10 kilograms; Lorraine cement-stone, 30 kilograms; sandstone, 10 kilograms; yellow ochre, 0.3 kilogramme. (5) The following formula may also be used:—Zinc-oxide, 5 kilograms; plaster, 10 kilograms; Lorraine cement-stone, 10 kilograms; yellow ochre, 0.5 kilogramme. (6) If an extremely strong cement is desired it can be prepared of oxide of zinc, 10 kilograms; and pulverised quartz, 15 kilograms. For the three last-mentioned cements, the liquid given above is used, only 10 litres of water are added instead of 5 litres. These cements can be applied with a brush like a paint. Colours are said to give good results. The coating adheres perfectly to the stone, and gives it the appearance of a newly cut surface, and at the same time forms a protecting cover against the inclemency of the weather. The stone should be well cleaned before applying the cement paint, and, if necessary, two or more coats may be given.

THE WORKSHIPFUL COMPANY OF CARPENTERS IN CONJUNCTION WITH THE COUNCIL OF THE CITY OF LONDON.—The following prizes have been gained prizes or certificates. First year.—A. W. Makovitsky, R. O. Faldon, F. Clark, Wearing II. T. Mather, W. H. Gurney, S. F. Trill. Second year.—Trinell, Allberry, E. C. P. Monson, H. T. Adlard, A. G. Dixon, T. A. Watson, F. W. Bateman, A. C. P. Dixco. Evening Classes.—S. Raffree, E. C. P. Monson, J. R. K. Yates, H. M. Lawson, A. C. Long, Higgins, F. C. Yates, H. M. Lawson, A. C. Long, F. Mayell, Woodward, E. Searchfield, H. C. Cregeen, H. Allberry, P. Ross.

THE COCKBURN ASSOCIATION AND THE IMPROVEMENT OF EDINBURGH.—The report to be submitted by the Council of the Cockburn Association to the annual meeting in October has just been issued. In it (according to the *Scottishman*) the Council say that since they presented their last annual report in July, 1891, the schemes of the various railway companies have been settled by Parliament, and "they are glad to report that since the formation of the Association seventeen years ago there has not been a year in which they have felt themselves less anxious to take steps to improve the amenity of the city than during the past year. It has rather been their pleasing duty to welcome several additions to the attractions of the city, to suggest improvements and to mark the increased desire among all the citizens to enhance the beauty and attractions of Edinburgh. The report upon the attractions of Edinburgh, Old Hall and Argyle Tower in the Castle and states that the Council are glad to be able to report that there is now a prospect of the hall and tower being suitably adorned with relics of the past, and the designs of the restorer, as an end being carried out upon the improvement of the Castle is now under the attention of the Government. The recently impending dissolution of Parliament prevented the Council from moving in the matter, but at the fitting time it will be their duty respect-

fully to impress on the Government the importance of executing upon the Castle buildings such structural alterations as may render them more worthy of the magnificent position which they occupy.

THE MEDICAL DEPARTMENT OF THE LOCAL GOVERNMENT BOARD.—The following appointments have been made in the Local Government Board office to fill the vacancies consequent on Sir George Buchanan's resignation and Dr. Thorne Thorne's appointment as Principal Medical Officer.

THE EAST END DWELLINGS COMPANY, LIMITED.—The Directors of this company have decided to declare an interim dividend, free of income tax, at the rate of 5l. per cent. per annum, for the half-year ending June 30 last.

LEGAL.

HOARDING AND GANTRIES TO BUILDING WORKS.

ST. GEORGE'S VESTRY v. H. J. WILLIAMS. A CASE of some importance to the building trade in London generally, in connexion with the right of enclosing building works with a hoarding above the gantry, was decided on July 22 at the South-western Police-court.

It appears that Mr. H. J. Williams, builder, of Bermondsey-street, is erecting two buildings in the High-street, Borough, on the sites of Nos. 116-118 and 202. Following the usual custom, application was made to the St. George's Vestry for a licence for a gantry, hoarding, and scaffold, which licence was granted by the Vestry for a period of two months for No. 202 and three months for 116-118.

Mr. A. M. Hiscocks, the Vestry's Surveyor, appeared on their behalf, and Mr. George Elliott (barrister), instructed by Mr. Foulkes Jones, solicitor, appeared for Mr. Williams.

Mr. Hiscocks submitted that his Roads Committee objected to the hoarding above the gantry entirely, and insisted upon its removal, because they held it was not included in their licence to Mr. Williams; that it was dangerous; that it was unnecessary for the execution of the works; and that as regards No. 202, the period of time stated in the licence had expired, and that as Mr. Williams had not complied with the order of the Vestry to remove the hoarding he asked for the full penalties and magistrate's order for immediate removal to be made.

Mr. George Elliott, on behalf of Mr. Williams, submitted that as the Vestry had granted licences for the scaffolding and hoarding on gantry, he was quite within his rights in erecting the hoarding above the gentries, because it was part of the same structure, and covered by the licences which he produced signed by Mr. Hiscocks; that the hoarding was absolutely necessary for the proper protection of the public from dust or pieces of brick and material and timber falling from the street below, and that to pull down old and rebuild new buildings with an open scaffolding would be throwing additional risks upon Mr. Williams and other builders, risks which were never intended by the Act; that the gantry was exactly similar to those in use all over London, and had been erected following the usual custom of the trade; that if it was the advertisements the Vestry objected to, Mr. Williams was perfectly willing to dispense with these, but considered it imperative that the site should be enclosed with a hoarding; that the hoarding was not in the slightest degree dangerous;

and, with regard to the period of time stated in licence having expired, he called the magistrate's attention to the case of the City Corporation v. Brass, in connexion with the building of the new Post-office, St. Martin's-le-Grand, wherein it was held by the High Court that the Vestry had no power to limit the period of time for hoarding, which should run as long as the hoarding was absolutely necessary, and the Vestry had no power to prevent advertisement.

In cross-examination Mr. Hiscocks said it was not the advertisements that were objected to, but his Committee wished the hoardings removed, and nothing else would satisfy them.

Photographs of the hoardings were produced in court, and submitted to the magistrate, who observed that it appeared to him the hoardings were the usual thing and seemed more likely to benefit the neighbours than otherwise, in protecting them from the building operations, and that the hoardings did not seem too high, as they were much lower than the adjoining buildings. He would therefore suggest that Mr. Williams consent to put back the hoardings above the gantry a little, so as to project a short distance beyond the scaffolding for holding the front, and allowing sufficient room for men to work. The hoardings to remain the same width and height as at present.

Mr. Williams consenting to this, the magistrate said he would make no order, the Vestry having failed in their case as to the removal of hoarding on licence having expired, and the case was adjourned for a week for the hoardings to be put back as agreed to by Mr. Williams, the advertisements to remain as before.

MEETINGS.

MONDAY, AUGUST 1.

Liverpool Engineering Society.—Excursion to the Dore and Chinley Railway, by permission of the Engineer, Mr. J. S. Jones. Story.

TUESDAY, AUGUST 2.

Glasgow Architectural Association.—Mr. W. Fraser on "Domes and their Construction." 8 p.m.

WEDNESDAY, AUGUST 3.

Builders' Foremen and Clerks of Works Association.—Ordinary meeting. 8.30 p.m.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

13,016.—HYDRAULIC CEMENT: G. Williams.—This invention relates to an improved process of making hydraulic cement, and consists in reducing carbonate of lime to powder by steam under pressure, produced from a solution of silicate of soda and water in suitable proportions, and adding to the powder so produced alumina and silica and a thin paste of chloride of calcium, crushed lime, and warm water, moulding it into convenient forms which are buried to white heat, so as to produce a clinker, which is then ground to a fine condition.

13,033.—ARTIFICIAL STONE MOULDS: W. N. Winter.—The object of this invention is to obtain a more perfect security to the forms of the moulds or boxes applicable for use in the manufacture of artificial stone paving, and other like uses, during the operation of filling-in and pumping the concrete and other materials, thereby preventing any possible expansion or shifting of the sides or bottoms of the moulds during the consolidating process. To carry this into effect the inventor supplies metal screw clamps constructed in such form as to clasp the bottom, sides, and top edge of the moulds or boxes at different sections, thereby perfectly securing the desired figure of the mould required, either in plan or in curved form.

6,242.—DOORS: H. H. Leigh.—This specification relates to improvements in the mechanism for securing doors and casements, so as to render it impossible for them to be taken open. It is claimed to be especially applicable to the doors and casements of dwelling-houses. This object is obtained by rather elaborate means, which can only be adequately understood by reference to the drawings annexed to the specification.

8,538.—SEWERS: C. Natter.—This patent refers to an improvement in the means for casing cavities or tilting wells, sewers, or other drains, its object being to provide a simple, inexpensive, and practicable method for walling these shafts, whereby the work may be completed from the top downward, thus avoiding the danger of caving-in of the walls, as often happens in the case of wells, the walls of which are left as they left in an imperfect or natural state until the well has been dug to a considerable depth beneath the surface. It is especially devised for use in circular cavities. The tiles used by the inventor, made in sections, having any desired surface area, the sections being concavo-convex in shape, and having the radii of their curves determined by the sizes of the cavity to be tiled. These sections are arranged in series surrounding and engaging the natural walls of the cavity, the sections being cemented at the joints. Each circumferential series is held in place against the natural walls of the cavity by the adjoining ring engaging the inner periphery of the sections, and crowding them out against the natural walls sufficiently tight to hold them securely in place until the joints between the sections are each cemented together, and dry and hard. In the meantime, other series of sections may be placed in position, and the work continued indefinitely.

9,077.—FIREPLACES AND GRATES: L. Crosswell.—This is an invention to be used in connexion with fireplaces in dwelling-houses for the prevention of fire from the escape of live coals, red-hot cinders, or the like. It consists essentially in the employment of a spring or other roller blind of asbestos cloth, or other fireproof flexible material.

9,191.—NAILS: T. Durran.—This refers to an improvement in double-ended nails used for fencing, protective, joining, and other purposes. Its object is to provide an ample clearance for manipulation of the nail hammer, and consists essentially in making the nail with the first entering end and the second entering end in planes occupying an angular relation to each other, preferably from between about 120 degs. to 150 degs. This attains the further advantage of materially strengthening the junction of the opposite ends of the nail, and rendering the same less liable to be broken in use.

NEW APPLICATIONS FOR LETTERS PATENT.

July 11.—12,708, A. Hewitt, Hinged Windows, &c.—12,717, S. Johnson, Water-waste Preventer.—12,724, F. Mayo, Joining Earthenware Sewage-pipes.

July 12.—12,746, W. Freeman, Automatic Flushing Apparatus for Toilet-Rooms, Sinks, &c.—12,751, C. Gander, Door-locks.—12,753, W. Thompson, Artificial Stone and other Similar Building Materials.—12,757, A. Strusholm, Tie-presses.—12,817, T. Ely, Water-waste Preventer.—12,822, J. Glover & W. Stevens, Casing-valves for Water-closet Tanks.—12,827, R. Newton, Sewer-traps.

July 13.—12,843, A. Varah, Attaching and Adjusting Door-knobs.—12,854, J. Parker, Wood Metals.—12,877, C. Coleman, Utilising the waste heat of Fires in Warming Rooms.

July 14.—12,896, W. Haddock and J. Hutchinson, Roses or Electrical Connections for the Ceilings of Buildings or Structures.—12,912, J. Brown, Chimney-top.—12,922, G. Taylor, Planting or Shooting Altimeter.—12,940, S. Heal and J. Heal, Chimney Cowls.

July 15.—13,032, C. Hedges, Sawing-stone.—13,044, J. Jones and H. Gibbs, Water-closet Tanks.—13,053, J. Parker, Organising Joinery, &c.—13,074, J. Hall, Masons' and Builders' Scaffolding.

PROVISIONAL SPECIFICATIONS ACCEPTED.

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SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 14.—By Humbert, Son, & Punt (at Orpington): Five plots of 1½ acre, Orpington, Kent, 307l.

JULY 16.—By Messrs. Cobb (at Canterbury): Two enclosures of land, St. Lawrence, Kent, 23a. 1r. 1p. 1, 1,300l.; ditto, do. 3r. 33p. 1, 1, 820l.; plot of freehold building land, 2r. 50l.

JULY 18.—By G. E. Swarver & Sons: "The Chantry," Bishop's Stortford, Herts, and 3a. 3r. 1, 2,600l.—By F. Farley: No. 214, Tinnell-pkrd., ul. 64 yrs., gr. 74l., r. 36l., 310l.—By Reynolds & Enson: 35 and 37, Scruton-st., Finsbury, 1, 965l.; l.g.r. of 7½, New North-pk., reversion in 18 yrs., 300l.—By Jones, Lang & Co.: l.g.r. of 35½, Highest, Wandsworth, reversion in 78 yrs., 900l.—By Fairlight Villa: Woodville-st., ul. 100l., East India Dock-rd., reversion in 23 yrs., 4,500l.; a plot of 1½ acre, South Hill-rd., Bromley, 180l.; "Pentre Coelias," Potter's-rd., New Barnet, 1, r. 352, 440l.; "Fairlight Villa," Woodville-st., ul. 300l., 310l.; 1, 2, 4 to 8, Rowlett-st., Poplar, 1, 1,745l.; l.g.r. of 3½, Rowlett-st., reversion in 45 yrs., 70l.; 361, 363, and 365, East India Dock-rd., 1, r. 944, 1,545l.; ginger beer factory, Wilson-st., Poplar, ul. 48 yrs., gr. 55l., r. 50l., 510l.; 4 to 10 (even), Wilson-st., ul. 47 yrs., gr. 51l., r. 21, 10s., 1,010l.; 177 to 183 and 201 to 213 odd, Grundy-st., ul. 50 yrs., gr. 22l. 10s., 1,620l.; "The Builders' Arms," Howard-st., ul. 56 yrs., gr. 17l., r. 53l., 540l.; 17, Howard-st., and 31, Ides-st., ul. 56 yrs., gr. 42l., 400l.; S. B. and 10, Cook-st., ul. 61 yrs., gr. 11, 15s., 440l.; 10 and 11, Orchard-pl., Blackwall, ul. 25 yrs., gr. 81l., 85l.

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JULY 20.—By H. Griffin: 77 and 79, Spekerd., Clapham, ul. 72 yrs., gr. 10l., 300l.; 22 and 24, Knox-rd., Battersea, ul. 75 yrs., gr. 10l., 300l.; 24 and 26, Brougham-st., ul. 71 yrs., gr. 4l., 300l.; 55, Kilross-st., ul. 74 yrs., gr. 6l. 6s., 170l.—By J. Hibbard & Sons: 10, 11, and 12, Anderson's Walk, Lambeth, 1, 700l.; 15 and 17, Forey-rd., Highbury-hill, 1, r. 53l., 700l.—By D. Smith, Son, & Oakley: 8, 10, and 12, Plough-rd., Battersea, 1, r. 83l. 7s., 600l.; 22, 24, and 26, Plough-rd., 1, r. 53l. 6s., 800l.; 110, 111 and 14 to 22, Field-pl., 1, r. 310l., 1,855l.; 49 to 60 even, Hope-st., Battersea, 1, r. 203l., 2,470l.; l.g.r. of 122, Courland-provs, Clapham, reversion in 40 yrs., and l.g.r. of 71, Myrtle-ter., Wandsworth, ditto in 70 yrs., 450l.; l.g.r. of 82, Wardley-st., ditto in 70 yrs., 135l.—By Hobson, Richards, & Co.: 136, Well-

ST. HELENS (Lancashire).—For erecting new town and other works, at the Brewery, St. Helen, Lancashire, for Messrs. Greatall, Whitley, & Co. Messrs. James & Co. Manchester, architects, 5, Bedford-row, W.C. Quantities by Messrs. R. L. Curtis & Sons.—
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 F. Voller £2,200 * Accepted.

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 Gunnison 1,785 0 Edward Wood 1,354 0
 Brookfield Co. 1,852 10 * Accepted.

UPTON PARK (Essex).—Accepted for erecting house and shop.
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 F. Voller £250 0 * Accepted.

ST. PAULS CRAY (Kent).—For erecting lodge and stables at South View, for Mr. T. H. Nash. Mr. G. St. Pierre Harris, architect and surveyor, 1, Basinghall street, E.C. 4.
 W. Owen £298 0 Somerset & Son, Clapham* £289
 Gregory & Co. £40 * Accepted subject to modifications.

SOMERSET.—For constructing a reservoir at the Western Joint Asylum, Somerset, for the County Council. Messrs. Giles, Gough, & Trollope, architects. Quantities by Mr. G. H. Cooke.—
 Facey £1,927 Pollard £1,690
 Clavidge & Bingham 1,132 Willcock, Wolverhampton* 1,083
 Spiller 1,700 * Accepted.

SUBBION.—For erecting a house on the Grass Estate, Subbion, Mr. Alfred Mason, architect, 1, Upper St. Thomas.—
 J. Piller & Son £2,398 W. H. Gee £2,139
 G. G. Mortimer 2,368 R. Nicholas, Kingston* 2,132
 H. J. Jarvis 2,273 * Accepted.

SWINDON.—For erecting new boys' school at Upper Stratton, Swindon, for the Stratton B.S. Margaret School Board. Mr. William Bruce, architect, Swindon. Quantities by the architect.—
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 F. Backs 2,824 0 Hy. Locker, Strat. 2,807 0
 H. Barrett 2,758 0 Son, Swindon* 2,690 0
 G. W. Whitshire 2,769 0 * Accepted.

TREHARRIS (Gloucestershire).—Accepted for the erection of a public hall and institute at Treharris. Mr. F. R. Bates, architect, Newport, Mon. —
 Morgan & Roberts, Newport £2,435 0 0

WOLDENHAM (Surrey).—For building house and stables, for Mr. Robert Baker. Mr. F. A. Lowell, architect.—
 William Smith £2,977 H. A. Holloway £2,899
 William Downes 3,327 J. O'Byrne 2,640
 H. Burnam & Sons 3,268 Martin Taylor, Croydon* 2,622
 * Accepted.

WOODFORD (Essex).—For the erection of a post office, Woodford, Essex, for Mr. J. W. Smith. Mr. J. C. Lewis, architect, Woodford. Quantities by Mr. Edward S. Mansergh, 28, Mount-street, W.—
 Harris & Warding £1,450 R. A. Viner £1,224
 G. J. Hosking 1,257 J. Norder 1,192
 J. Bentley 1,258 T. Osborn & Sons 1,111
 P. J. Cozhead 1,273 * Accepted.

Read-making, Bromley, Kent.—Mr. Hugh R. Cogges, Surveyor to the Bromley Local Board, writes—in the list of tenders for making up Oaklands-road, which appeared in your issue of last week, it was announced that plot of Full Road had been accepted; but since then no error of 2 1/2 has been discovered in their tender, making the amount £1,148. 5s. instead of £1,144. 5s. in consequence of which, Messrs. J. Moulton & Co.'s tender of £1,175 has since been accepted.

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D. E. (we shall be glad to give the substance and result of the report when made. The mere statement that a report is to be made is hardly of much interest).—T. & S. (shall have attention).—C. E. K.

All statements of facts, lists of tenders, &c., must be accompanied by the names and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

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The Builder.

Vol. LXIII. No. 2583.

August 6, 1892.

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Stafford County Council Buildings: Principal Elevation of Selected Design.—Mr. H. T. Hare, Architect.....	Single-Page Photo-Litho.
Selected Design for Stafford County Council Buildings: Perspective Sketch	Single-Page Ink Photo.
Plans of Selected Design for Stafford County Council Buildings	Two Single-Page Ink Photo's.
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Later Scotch Castles.



WE may congratulate Mr. MacGibbon and Mr. Ross on having completed their monumental work on Scotch castles,* which has gone on expanding under their hands till it has now swelled into five volumes. Possibly the fifth volume is not exactly a necessary part of the scheme, and is filled up in rather an *olla podrida* manner, though it is all interesting. The fourth volume continues the illustration of castles of what the authors have called the Fourth Period, and at the close branches out into the subject of "Houses in Towns," as influenced in their architecture by the castellated buildings; and continuing this subject into the fifth and unexpected volume, we have also some churches and a long illustrated chapter on sun-dials; and the book concludes with a summary of the information which the authors have been able to collect as to early Scottish masters of works, master masons, and architects. This information is of real interest, and the carrying out of the subject into a fifth volume has also given room for the addition of a long supplement in regard to smaller castles which had been omitted in their proper place, and information about which had come into the authors' hands since. This, of course, is a valuable addition, and renders the book more complete. We confess that the chapters on town houses and churches seem rather like padding, arising out of the fact that there was too much matter, in the real line of the book, for the fourth volume and not enough to make a good fifth one. The portions dealing with town houses and churches do not pretend to exhaust those subjects, but merely to give some interesting examples; and this is rather out of keeping with the complete style of the bulk of the book. It would have been better to have terminated the castles of the fourth

period with the end of the fourth volume, and made a small fifth volume under the title of "appendix," giving the castles omitted before, and the information about ancient master-masons. The book would then have been a complete whole. As it is, the closing volume is weighted with matter which does not properly belong to the scheme of the work, and that is always an injury to a book, especially a book which is intended to take a permanent place as a leading illustrative work on the subject of which it treats.

The fourth period, of those into which the authors have divided their subject, and which is in process of continuation in their fourth volume, comprises the class of castles the design and plan of which were affected by the double influence of Renaissance taste and the introduction of fire-arms. The use of artillery naturally enough did away with the ancient *enceinte* wall, which could not be made artillery-proof except at a greater cost than the means of a private owner could supply. The castles were to be made defensible against sudden attack, and the walls were pierced for musketry in suitable places, and a form of plan was adopted which enabled one portion of the building to command another. There can be little doubt that this practical object was the main origin of the two most favourite and important forms of plan in the later Scotch castles, the L-plan and what the authors call for convenience the Z-plan, but which is really a plan in the shape . In the L-plan each of the inner sides commands the other; in the Z-plan, which is much more complete and scientific in a military sense, the projecting towers at opposite ends and sides of the main building each command one side of the building, which is thus defended both on the inner and outer side. It is hardly correct, however, to ascribe this form of planning directly, as the authors do (vol. iii. page 368), to the influence of fire-arms. It was the invention of artillery which removed the *enceinte* and drove the builders to recast the ancient keep on these new lines; but the perception that a projecting tower allows of flanking an attacking party up to the very walls of the main building would be equally to the purpose whether the weapons were muskets or cross-bows: it merely means an improved

and more scientific perception of the art of defence. The authors are quite correct, however, in their remark, in the same place, on the peculiar combination which the late Scotch castles present of Renaissance architecture with castellated features of an older time, stern-looking corbelled-out turrets, &c. The French *château* presented something like this combination at an earlier period, but not with such a late style of Renaissance. It is this combination of late Renaissance detail with castellated detail which has survived from an earlier period, that gives to late Scotch castellated architecture its peculiar and unique character.

The majority of the castles of the late period illustrated in vol. iv. are rather small ones, illustrating the various types of plan which may be indicated by the letters L, Z, T, and E, of which, as already suggested, the two former are the most interesting and most numerous. The L-plan, with a large circular turret at the re-entering angle, is one of the most favourite arrangements, and is capable of very picturesque effect in an architectural sense. In later examples we return again in many instances to the courtyard plan, either as a complete quadrangle or a portion of one. The persistence or recurrence of certain central types of plan through all these changes is to be noted. The early castle was a keep within a courtyard, the latter being surrounded by buildings for defence only, not for habitation. In the seventeenth century we come to the courtyard plan again, but now it is the habitable building itself which surrounds the courtyard. So again, in the L and Z castles without courtyards; these are simply the keep deprived of its *enceinte*, and modified in form, from its original simple square or parallelogram, into a form capable of self-defence.

Holyrood and Heriot's Hospital, as important examples of the courtyard plan, are very fully illustrated, as the book could not be complete without them, but these well-known buildings are not of such special interest to readers as some of the smaller and little known examples, the illustrations of which afford a mine of suggestions for picturesque treatment. Among them we may mention especially Murthly Castle, with its façade flanked by circular angle turrets (in this

* * * Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth Century." By David MacGibbon and Thomas Ross, architects. Volumes iv. and v. Edinburgh: David Douglas, 1892.

case rising from the ground and not on corbels), its simple treatment of doors and windows, and its two "corbel-stepped" gables connected at the base by a balustrade, a curious union of Scotch and Renaissance features. Thurso Castle, no longer existing in the form shown here, is another most characteristic example, looking like a long plain country house with sash windows, from the front of which project circular turrets with conical roofs. In Thirlstane Castle we have a much bolder example of the same kind of combination, the circular turrets in this case forming partial supports to a boldly projected machicolation, over which is a Renaissance halustrade with the roof and small dormers recessed behind it. This is one of the most picturesque illustrations in the book, and a very suggestive lesson as to the effect to be got by the combination of what at first sight might seem totally incongruous elements. Preston Lodge staircase, with its curiously attenuated haluster columns rising from the top of the lower newels to the underside of the upper ones, is interesting.

Although, as we have said, the portion dealing with houses in towns is rather out of the scope of the book, the preliminary sketch of the character of Scotch street architecture is of considerable interest, and conveys a good idea of what must have been the aspect of a street of the sixteenth century in a Scotch town, with its masonry walls as the substantial structure, and wooden galleries and verandahs thrust out in front of the walls. "It can be well imagined," as the authors observe, "what a picturesque aspect these galleries would present, and what an animated and brilliant appearance they must have had when filled with spectators, and decorated with rich hangings on occasions of public importance and display." Of the churches which are illustrated as exhibiting the architectural influence of the castellated architecture on this class of building in Scotland, a good many seem to us to be not much to the point in this respect, though they are all more or less interesting work; but the towers of Pittenweem and Anstruther Churches, with their combination of heavy turrets with corbelling, massed into ordinary square-church-towers with halustrades over the eaves, are certainly curious and characteristic, and form such an architectural grouping as we could hardly expect to meet with anywhere but in Scotland.

Many illustrations are given of the peculiar forms which the sun-dial took in Scottish hands. These may be grouped under two heads; the obelisk form, with generally a large projection or swelling in the middle of its height (one of which many of our readers have probably inspected in the middle of the grand "formal garden" of Drummond Castle), and the other which the authors not unsuitably define as the "lectern" form, and which they suggest was really a transformation into stone of the "torquetum" of Apian (a professor of mathematics at Ingolstadt), one of which is represented in Holbein's "Ambassadors" picture, an instrument by which "the position of the sun, moon, and stars could be indicated at any hour." What is certain as to these dials is that in their stone form they must have been very useless, mere puzzles, and that they are very ugly. The English sun-dial is a beautiful object, which can be practically used for its purpose; the Scotch sun-dials seem rather like exhibitions of cleverness to very little purpose, and are entirely devoid of the sentiment of repose which belongs to the English type. The authors mention one form, at Scotsraig, in which a cross, placed to the required angle, forms the gnomon, the hours being read by the shadow of the head of the cross projected on the upper edge of the arms. We recently saw one of this type in England, set up in the garden of a Sussex rectory, but we cannot give its date or history.

The chapter on ancient Scotch masons and masters of works gives a great deal of curious information, and we have no doubt the authors are right in their conclusion that

the Scottish architect, even in the later periods of castellated architecture, was not much in request (was he much in existence?), and that the various buildings were erected by masons under the laird's instructions, as Mr. Gutch maintains (perhaps with equal correctness) that the English Renaissance mansions were built. In the case of Glamis Castle "we have a very striking example of a structure carried out from the designs and under the personal superintendence of two successive proprietors,—Patrick, first earl of Kinghorn (1578—1615), and his grandson Patrick, the third earl (1647—93). The hook of record of the latter shows how closely the work was designed and supervised by himself." It is noticeable, too, that Glamis is, *en bloc*, one of the most picturesque buildings of its class. How the details would bear inspection is another question.

We congratulate the authors on the completion of a very fine and valuable work, which every architectural library should possess. It seems to have excited a great deal of attention and interest in Scotland, for it is partially owing to the amount of additional information gratuitously furnished to them since the commencement of the undertaking, that the authors have been encouraged and enabled to extend it beyond its original limits, and render it a probably complete summary of the castellated dwellings of Scotland.

THE "GRAVENKASTEEL" OR "CHATEAU DES COMTES," GHENT.

By GENERAL WAUWERMANS, PRESIDENT OF THE ARCHEOLOGICAL SOCIETY OF ANTWERP.

THE origin of Ghent may be traced to a remote epoch. It is supposed that the first dwellings were erected upon some rising ground between the Scheldt and the Lys, known as Mont Blandin, where the inhabitants, doubtless, took refuge against the inundations which, even in our time, periodically submerge the left bank of the Lys and the right bank of the Scheldt towards Tronchiennes and Ledeherg. Numerous Roman remains testify to the fact that the town was already inhabited in the days of Nero (53 A.C.), perhaps, at an earlier date still, judging by the vestiges of a temple of Odin, the Mercury of the Germans, that was destroyed by the early Christians on Mount Blandin.

Ghent, originally called *Heerehem*, "the home of the lords," was probably a centre of maritime defence for the Romans, and served to protect the coasts of Flanders against the invasions of the pirates of the north. Traces may still be found of by-roads leading to Oudenburg, Bouchout, Antwerp, the mouth of the Scheldt, and Zealand. Certain authors attribute to the Romans the cutting of the mysterious artificial waterway known as Otho's Ditch (la fosse d'Othou) which would appear to have been made in the time of Constantine Chlorus (290) to resist an invasion of the northern hordes. This canal placed the port of Ghent in communication with the Braekman, the Western Scheldt, and the Zwyn.

In 620 St. Amand, who came to preach Christianity at Ghent, founded upon the site of Odin's temple the Abbey of St. Peter. In 630 St. Bavon undertook the conversion of the barbarians north of the Scheldt, and founded the Abbey of St. Bavon, around which a kind of floating population gathered itself. The group of buildings thus formed was called Ganda, or Gandavum, and gave its name to the whole agglomeration.

* Otho's ditch still exists in Ghent. It has been partly covered over and forms a street which runs before the University Library, formerly the Abbey of Babelon.

† St. Peter's Abbey, which commands the town of Ghent, is now used as a barrack. The church is well worth a visit.

‡ This abbey was transferred to the St. John's Church, now called Cathedral of St. Bavon, by Charles V., when he wanted to build a citadel on the spot where St. Bavon first established his monks. The ruins of the old abbey still remain near the Stadion du pays de West and are most interesting. Their Roman origin is indisputable. They form now a museum.

In 811 Charlemagne established dockyards at Ghent for the purpose of fighting the Normans. This fact confirms the hypothesis of the previous cutting of the canal of Otho, for without the existence of a double fluvial communication between Ghent and the sea, by means of the canal on the one hand and the Scheldt on the other, there could have been no motive for selecting it as a centre of maritime defence, which otherwise would have been better found by Charlemagne further down the River at Rupelmonde, a place that commands the mouth of nearly all the rivers of Western Belgium.

It is said that Eginhard, Charlemagne's secretary and son-in-law, was placed in authority over the two abbeys of St. Peter and St. Bavon, each retaining, however, a distinct dominion. The abbots of St. Peter held sway over the centre (*Keure*) and the post of *Heerehem*, while the abbots of St. Bavon continued to proselytise the Pagans of the Marches between the Scheldt and Otho's ditch, a district known as Wasda, or the land of woes.

The abbey of St. Peter depended upon the imperial diocese of Cambrai, while St. Bavon formed part of the diocese of Utrecht and held authority over the Marches of the German Empire.

In 852 Baldwin Fercus (Bandouin bras-defer) and Regnier "au long col" defended Neustria and Lotharinga against the Normans.

The history of these two warriors presents the curious analogy that both had quarrelled with their chiefs on account of clandestine marriages with the daughters of the latter, and that both were reconciled by their irate father-in-law and confirmed by them, with their children after them, in their high functions. Baldwin, who had married Judith, the daughter of Charles the Bald, became Marquis of the Flemings. Being declared the champion of the kingdom, he established a military frontier to the north of Flanders by constructing the castles of Bruges and of Ghent, and possibly at intermediate stations as well.

This was the origin of the old castle of Ghent placed beyond the Lys, and answering to the type of a frontier stronghold destined to act against the northern regions, while holding in check the turbulent population of *Heerehem* to the south and separated from the Wasda by the ditch of Otho.

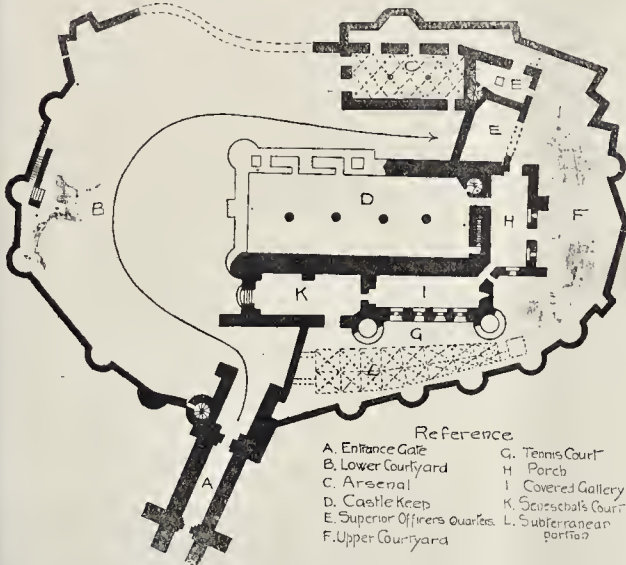
The Castle of Baudouin bras-de-fer, restored by Arnould le Vieux, occupied by Wichmann, was reconstructed in 1180 by Philippe of Alsatia, Count of Flanders, upon his return from Syria, as set forth by a carved inscription upon the entrance of the gate. If it is not possible to fix the exact date of this reconstruction, it is at least certain that it offers the first example of a Medieval stronghold showing the influence of the Syrian type brought back by the Crusaders, and that it was erected at least fifteen years earlier than the famous Château Gaillard des Andelys, built by Richard Cœur de Lion in 1196, and generally supposed to be the most ancient specimen of a Romano-Byzantine fortress in Europe.

The Château des Comtes was abandoned as a princely residence in 1353 by Count Louis le Male. He took up his abode in the more splendid palace known as the Cour des Princes, of which the ruins are also to be seen at Ghent. This was the birth-place of Charles V.

The ancient castle became a state prison, and sheltered behind its walls the unhappy Countess Jacqueline de Barviere. In 1419 it became the seat of the Council of Flanders, which had held its meetings hitherto at Lille. In 1779 it was divided into lots and sold at a public sale to a contractor called Brisemalle. Thenceforth the Château des Comtes lay dismembered and forgotten behind factories, workshops, and labourers' dwellings, until the only trace that remained of it was the stone archway of the entrance, overlooking the Place Ste. Pharaïde, that strangers looked up at curiously. In 1829 a cotton mill, belonging to M. Couvreur, being destroyed by



Restored View of Château des Comtes, Ghent.



- Reference
- A. Entrance Gate
 - B. Lower Courtyard
 - C. Arsenal
 - D. Castle Keep
 - E. Superior Officers' Quarters
 - F. Upper Courtyard
 - G. Tennis Court
 - H. Porch
 - I. Covered Gallery
 - K. Scaen's Court
 - L. Subterranean portico

Plan of Château des Comtes, Ghent, showing the Existing and the Restored Walls.

ire, some archeologists in Ghent petitioned against its reconstruction, but lost their case, nobody at that time understanding the historical value of the old castle. It was only two years ago that some architects, antiquarians, and artists, under the guidance of M. de Maere de Limnande, formerly deputy of Ghent, succeeded in inducing the municipality of the town and the Belgian Government to acquire the territory, and to deliver the building from the parasitical constructions that overlaid it. To-day the ruins, being disengaged, present the aspect of imposing vestiges of a feudal fortress, of which no counterpart can be found save in Syria.

Such as the castle appears to day it constituted the citadel (kasteel, hof, burg) of a military town, separated from Ghent by the Lys. This town was the town of the Counts of Flanders (Gravenstad). Beyond the Lys there was an entrance yard (voorhof-voorburch), serving at one and the same time to protect the frontier and to hold in check the town of Ghent, which was the suburb or suburb.

Of the Gravenstad no trace remains to-day, but its limits may be determined by the ancient ditches and the direction of the streets. It was bounded on the south by the Lys, on the west by the Lieve, on the east by

the ancient ditch of Otho (actually the Sas Canal), and on the north by a canal, filled in and built over by the Rue des Corroyeurs.

The Gravenstad possessed four gates or bridges, like the Roman camps.

The principal gate was on the west, leading to Bruges (hoofde brugge, corrupted into "beheading bridge" because beheadings took place there. "Hoofs" in Flemish has the double signification of principal and head). It was the *porta decumana* of the Romans.

The Gate of the County on the south, giving access to the town of Ghent (*Grave brugge*).

Besides this there were the Gate of the Burg grave, or Viscount, on the north (*Burg-grave brugge*); later, the gate of St. Eloi, from the name of a neighbouring convent; and the Grey Gate (*Grave poort*), the *pretorium* of the Romans, giving access to the Wasda. Before this last gate stood a small castle (Chastelet), where the court of justice of the Wasda held its sittings.

In the interior of the Gravenstad, the Graven Kasteel, or Castle of the Counts, and their residence, stood at the north-eastern angle. The Church of Sainte Veerle, to-day of Ste. Pharaïlde, stood at the south-eastern angle.

The ruins of the castle as it was rebuilt by

Philippe d'Alsace are in perfect preservation, though complicated by later additions, whose origin and purpose it is not always easy to determine.

We enter them by a gate on the place of Ste. Pharaïlde, which is still intact, and find ourselves in a low courtyard before a large and powerful keep. If we go to our right in passing between it and a building called a chapel,—though more probably it served as an arsenal (*salle d'armes*), surmounted by an upper story, containing, no doubt, the lodgings of the superior officers,—we arrive in an upper courtyard (*kaets plaets*, or tennis-court, *cour du fin de paume*) where two buildings abutting against the donjon may be observed, the one a kind of porch, the ancient chamber of archives or greffe of the tribunal of Flanders, and a covered Roman gallery. Under this yard are vaulted dungeons, that served probably as prisons. The whole is encircled by thick walls in good preservation, flanked by towers built en encorbellement.

Besides the entrance-gate, the chapel or arsenal, and in the upper court the building that we have named (the covered gallery), are remarkably well preserved. The keep, which formed a rectangular edifice of enormous dimensions and of a great height, is unfortunately partly demolished in one of its angles.

Beneath the building which we suppose to have contained the officers' quarters, connected with the keep by a mediæval vault of very curious construction, a subterranean prison of great interest has been discovered. Dungeons, or *oubliettes*, of whose purpose no doubt can be entertained, have been found also under the keep.

Excavations made on the south side of the keep have led to the discovery of a primitive subterranean story, evidently anterior to the overlying construction, which dates from the days of Philip of Alsatia. It has crenelated apertures upon a level with the soil, which seems to prove that it was only hurried in consequence of the filling in of the upper court. It bears indications of having been constructed in the time of Baudouin bras-defer or Arnould le Vieux, 849.

This last discovery is of importance, as it testifies to an advanced art of construction among the Flemish people in that remote age, and which they introduced in all probability into England.

NOTES.

THE last number of the *Journal of Transactions* of the Institute of Architects contains a most important communication from Baron de Geymüller, suggesting no less a work than a grand monograph of the drawings left by the great masters of architecture from the fifteenth to the eighteenth centuries. Baron de Geymüller has himself done a wonderful amount of work, for one man, in disinterring and publishing original drawings of architects of the Italian Renaissance, and it is not surprising that his interest in the subject, so fascinating in itself and of such importance in the study of the history of architecture and of the design and carrying out of great architectural monuments, should have fired him with the idea that, with proper arrangement and co-operation, all existing documents of this kind might within a reasonable period be collected and published. Judging from his own experience, he believes that the methodical examination of the various European collections, and the photographing of from 5,000 to 10,000 drawings, might be carried out in the space of five years, with perhaps one year more for the publication of the catalogue, comprising three volumes and about 1,000 photographs of the smallest drawings. Baron de Geymüller had thought that one of the wealthy Americans of the day, many of whom take so much interest in art and archeology, might have been willing to find the funds for such a work, and with this end had already communicated with the American

Institute of Architects, asking the President to examine the project and communicate with him as to the best means of realising. The President, Mr. Kendall, stated that the idea had been received with enthusiasm by the Directors of the American Institute, and that they thought it possible to raise one-third of the funds for the work in their country, if the remaining two-thirds could be raised in Europe. Baron de Geymüller's letter to our own Institute is practically, therefore (though he does not say so in so many words), an invitation to us to consider what we in England can do towards furthering a project of such great interest. We have no doubt that the subject will be one of the first to receive attention when the Institute meets after the recess, and it is to be hoped that English architects will not be behind their brethren in America in endeavouring to assist the scheme. Such a collection would be a splendid possession for every important architectural library.

SIR ARCHIBALD GEIKIE'S address as President of the British Association is one of the class of addresses which cannot fail to have a popular as well as a scientific interest. It is a sketch of the progress of geological theory as to the age and the structure of the globe we inhabit, put in language intelligible to every educated reader. The salient point in the address is no doubt the reference to the modern dispute between the geologists and physicists as to the unlimited character of geological time. The geologists have regarded the extent of time behind them, for the formation of the earth's strata and remains as now existing, as practically incalculable; time was no element in the question, as far as our intellects can realise time. The modern physicists, such as Lord Kelvin, now aver that from the evidently high degree of heat still existing below the crust of the earth, and the estimated time occupied in cooling to its present state, an approximate limit must be fixed to the "backward and abyss of time" as far as regards the geological history of the earth. Lord Kelvin will allow us twenty millions of years behind us; but Professor Tait, less large-minded, cuts us down to ten millions of years. This is certainly a terrible reduction from the old vista of illimitable and uncomputable time, and no wonder the geologists feel rather hank at this reduction of their resources. Sir A. Geikie is of opinion that there must be some flaw in the physical argument, though he does not pretend to be able to say where it is to be found. But he states that at the present observed rate of sedimentary formation the existing strata of the earth's crust should have taken seventy-three millions of years to form, at the most rapid estimated rate of formation as now observed, or 680 millions of years at the slowest rate. "It may be argued that all kinds of terrestrial energy are now growing feeble, that the most active denudation now in progress is much less vigorous than that of bygone ages, and hence that the stratified part of the earth's crust may have been put together in a much briefer space of time than modern events might lead us to suppose. But," adds Sir A. Geikie, "no confirmation of this argument can be gathered from the rocks."

"On the contrary, no one can thoughtfully study the various systems of stratified formations without being impressed by the fulness of their evidence that, on the whole, the accumulation of sediment has been extremely slow. Again and again we encounter groups of strata composed of thin paper-like laminae of the finest silt, which evidently settled down quietly and at intervals on the sea bottom. We find successive layers covered with ripple-marks and sun-cracks, and we recognise in them memorials of ancient shores where sand and mud tranquilly gathered as they do in sheltered estuaries at the present day. We can see no proof whatever, not even any evidence which suggests, that on the whole the rate of waste and sedimentation was more rapid during Mesozoic and Palaeozoic time than it is to-day. Had there been any marked difference in this rate from ancient to modern times, it would be incredible

that no clear proof of it should have been recorded in the crust of the earth."

On the whole it seems to us that the balance of the argument is in favour of the geologists.

THE report which has just been presented by the Manchester Ship Canal Committee to the Corporation of that city will hardly be read with pleasure by the ratepayers. It states that at least one million and a quarter more money will be required, and it suggests that still further amounts than this may be necessary. We have steadfastly maintained that the Corporation of Manchester were not justified in becoming partners in a speculative commercial undertaking, even though such undertaking, if completed, should be of indirect benefit to the city. The present report shows in a stronger light that a community should leave such undertakings to private individuals. We regret also to have to say that the Corporation appear to have embarked in this business without taking proper precautions. The Committee state that it is to be regretted that the estimates first presented by the Company to the City Council, and the measurements upon which they were based, should have proved so unreliable. But if the Corporation were to find the money to complete the Canal, the first thing was to ascertain by independent investigation whether the estimates and measurements submitted by the Company were correct. The Corporation were coming to the assistance of what was practically a bankrupt concern, and therefore the utmost caution was necessary before one penny of the ratepayers' money was invested in the business. At present it looks very much as if not only the original shareholders would never receive one penny of interest, but also as if the Corporation would have to go without any interest on their first advance. It is constantly forgotten that the Ship Canal will have to bear the brunt of a keen competition by the railways. It stands on altogether a different basis from the Suez Canal, and every million more money that is put into it weights it more heavily as a commercial undertaking.

DR. TRISTRAM, Q.C., Chancellor of the Diocese, has delivered judgment in the matter of the faculty for St. Mary-at-Hill, by Eastcheap. On May 9 last an Order in Council was issued for the removal to Norwood Cemetery, or some other consecrated burial-ground, of all human remains (very great in number and near to the surface) beneath the floor, consequently upon the reports of Dr. Hoffmann, of the Home Office, and of Dr. Sedgwick Saunders, Medical Officer of Health for the City, coupled with the churchwardens' evidence. The necessity of carrying out sanitary measures of this kind has been advocated in our own columns.* Inasmuch as the cost, estimated at from one to two thousand pounds, will far exceed the moneys now allotted for repairs and extraordinary expenses, Dr. Tristram pointed out that, under the Obarity Commissioners' scheme in respect of the parochial property, application could be made by the churchwardens for an appropriation in this behalf. The Commissioners lately divided the parish funds into two amounts,—the one of 865*l.* per annum as church or ecclesiastical property, the other of 1,331*l.* per annum for general purposes. The church, which since the Fire has served for the united parishes of St. Mary-at-Hill and St. Andrew Hubbard, was closed in October last. It contains some carving ascribed to Gihbons, with that executed by Rogers for the repairs of 1848-9; and a halachino of Flemish workmanship. The organ (since enlarged) was built by Hill from the designs of the then organist, Mr. F. C. Burrows. Wren re-built the domed interior; altered, we believe, by James Savage (the architect of St. Luke's, Chelsea), and the existing east end; the side walls, the west

end, and the tower were subsequently reconstructed in brick.*

THERE can be very little doubt that the contention of the London County Council, in the arbitration before Sir Frederick Bramwell, in regard to the basis on which the tramways are to be purchased, is the right one. The contention of this body is that they are only bound to pay for the actual structural value, without regard to any profits which may be earned by any particular part of the undertaking. Such seems to be the meaning of the Act of Parliament which empowers the Council to purchase the tramways. The question cannot now be decided until after the Long Vacation; but there is no particular reason for hurry in the matter.

THE records of the Patent Office are sometimes curious reading. At least one patent, and probably more than one, has recently been taken out for utilising the energy of tramps. The idea is to reverse the penny-in-the-slot machine, to provide a handle for your tramp to turn, doing some useful work such as grinding coffee or charging accumulators, and when he has done a penny worth a penny comes out of the slot. The difficulty is that, apart from the fact that tramps have seldom any spare energy, mechanical work is so cheap that even an industrious and starving man might hesitate to sell his labour at the market price. Mr. Crompton estimates the sheer cost of energy at 2*d.* a unit. At this rate a man would have to work hard from three to four hours for his penny. If, on the other hand, the payment were raised to a price which would tempt the unemployed, say a penny for five minutes' easy work, we should soon find some enterprising individual taking round a small motor and a couple of accumulators, to sell dear to the automatic machines energy which he buys cheap at a central station.

THE *Daily News* states that Cumnor Park will shortly be offered for sale. Of Cumnor Place, latterly known as Dudley Castle, or Cumnor Hall, scarcely any vestige remains. Anthony Forster, *obit* 1572, devised it to the Earl of Leicester, but it remained for long uninhabited save by, as the vulgar fully believed, their victim's shade. For two centuries and a half it has belonged to the Berties, Earls of Abingdon. Cumnor had been a retreat or pleasureance of the mitred abbots of Abingdon, and is considered to have been built by William de Comenore, elected abbot in 1331. At the suppression, Thomas Rowland (or Penthecost), last abbot, had a grant for life of the manor, which the King then gave, Oct. 8, 1546, to his physician, George Owen, whose son William sold it in 1561 to his tenant, Anthony Forster. On Sunday, Sept. 8, 1560, Amy Robsart met with her death: on the 22nd of that month her body was finally laid in a brick vault beneath the choir of St. Mary's, Oxford.† In the chancel of St. Michael's, Cumnor, is the rich altar-tomb of Forster, with brasses of him, his widow, and their children: his epitaph describes him as a very worthy man—a great musician, builder, and planter. He made some alterations, in the Tudor style, at the Place. The house itself, built of stone, and roofed with slate, lay around a quadrangle, 72 ft. by 52 ft., and had seven rooms on the ground-floor. Along the west side stood the hall, 44 ft. by 22 ft., having an

* Writing to the *Times* of April 16 last, Mr. H. C. Richards says:—"When the church was threatened with removal by a clause of the Inner Circle Railway Bill, the City Church and Churchyard Protection Society was founded, and Mr. Percy Wyndham led an opposition in the House of Commons which secured the abandonment of the obnoxious clause, and induced a number of his fellow-members, including the Chairman of Committees, to visit the church, which ranks next to St. Stephen's, Walbrook, and has the finest pulpit and organ-gallery in the City."
† Her ancestor, Sir John, *obit* 1450, was buried in St. Francis's Chapel, Grey Friars (Christchurch), Newgate-street. She was born, it appears, at Stamford Hill, Norfolk, where Rush murdered Isaac Jermy and his son, in 1843.

* See "Note" in the *Builder* of February 27 last.

open timber roof, its outer walls being 3ft. thick and 14 ft. high, supported by buttresses; in the south-east angle stood the chapel; the staircase down which Amy Robsart is said to have been thrown was a newel staircase, giving access to the Long Gallery." In or about 1750 Cumnor was let to a farmer and maltster, who converted it to the uses of his business. Eighty years ago most of the materials were taken for the re-building of Wytham Church, Berkshire, and what remained has gradually been demolished. They placed two traceried windows in the new church, an arched doorway from the hall in the church porch, two other doorways in the tower and in the wall between the churchyard and Wytham Abbey, Lord Abingdon's seat. We gather that at Cumnor no relic remains of the house excepting a portion of the east side abutting against the churchyard.

THE news that the Royal Exchange is to be decorated with a series of paintings, of which the first will be contributed (as a gift) by the President of the Royal Academy, and the remainder are to be executed by other eminent painters in accordance with a general scheme for the whole series, must be welcome to all who wish to see art a subject of more general interest in this country. An undertaking like this on the part of a purely commercial society shows that some real progress has been made in this direction in England.

LETTER FROM PARIS.

THE Government, which for twenty-two years has put up with the melancholy spectacle of the ruins of the Cour des Comptes in the very middle of Paris, has nevertheless ordered the entire destruction of the ruins of the palace of St. Cloud. The decision is to be regretted, both from the picturesque and the historical point of view. The ruins in their present state, overgrown with ivy and wild flowers, present no forbidding appearance and, in fact, form a very attractive feature in the wooded landscape in which they stand. No explanation has been given for the decision, against which the inhabitants of St. Cloud have at the last moment, strongly protested. But these remains of a historic place have been sold to a contractor for the paltry sum of 3,000 francs, and in a few days the pick and shovel will have destroyed the remains of this great Imperial residence.

As the destruction of such a building may lead to interesting discoveries among the ruins, the State has reserved an exclusive right to all objects of value, documents, money, medals, jewels or statues which may be discovered in the course of the demolition. On the other hand, the contractor, M. Kasel, remains proprietor of the splendid "frontons," which, in spite of fire and bullets, are in sufficiently good condition, and of which he hopes to make a good sale; and some of this work no doubt will prove a treasure to amateurs of historic and artistic curiosities. Green sward will soon occupy the site of the palace where "Monsieur," the brother of Louis XIV., gave the splendid fêtes the record of which is preserved in contemporary literature. It may be remembered also that at St. Cloud died Henrietta, daughter of Charles I. of England, and that two Sovereigns, Charles X. and Napoleon III., at an interval of forty years, each passed in this palace the last year of his reign, the one before his exile, the other before his defeat and captivity.

Last week, the public were admitted to the Ecole des Beaux-Arts to see the exhibition of the works of the competitors for the Prix de Rome in painting and sculpture. The subject given for painting was the affliction of Job, but unfortunately the competitor had none of them entered into the feeling of the subject, the submission of Job to his calamities; they had only represented, more or less successfully, an old Italian model well known in the school, with an aspect more or less sordid. M. Lavergne, the pupil of MM. Lefebvre and Lévy, who had the second Grand Prix in 1890, has obtained the first one this year. He has real

qualities as a colourist, and more of artistic sentiment than his fellow students. The second prize was given to M. Mitrecoy, whose picture seems to promise well for his future; he is the pupil of Lefebvre and Tony Robert-Fleury. In sculpture the subject was also taken from the Old Testament, —Adam driven from Paradise to till the ground. The subject has been in the main well treated by the ten competitors in this branch of art. The first prize has been awarded to M. Hippolyte Lefebvre, pupil of M. Cavalier, who has certainly treated the subject best. His figure represents Adam standing near a bush of brambles, leaning on a knotted branch and wiping the sweat from his face; the expression of the face is energetic, the torso finely modelled. M. J. Marie Clausade, to whom the second prize was awarded, has learned from his master, M. Falguière, a vigorous style of work. M. Emile Delépine, another pupil of M. Cavalier, also obtained a second prize. These two last-named competitors, instead of representing the first of men at his labour, have preferred to represent him wearied, meditative, and apparently regretting his lost Paradise. The result of the competition in architecture is not yet known; the subject given is "La Façade et les Plans d'un Musée d'Artillerie."

Before separating, the Municipal Council have definitely decided the question, which has been discussed for eight months, of who should succeed M. Alphand. Not finding any one capable of assuming the responsibility of the sole directorship of the works of Paris, they have preferred to make a division of the Empire of Alexander. The waterworks, the drainage, the roads and lighting, the public works of the Department, in particular that of the city of Paris, the public carriages, the public ways, the plan of Paris, fine arts, architecture, and, in a word, all this great administration which M. Alphand held in his hand, and which made him a more powerful Minister than even the Prefect of the Seine, has been divided and given to other municipal bodies. Architecture, which, by the way, had suffered not a little by being under the direction of an Engineer of Ponts et Chaussées, will now be under the authority of an Inspector-General, M. Bouvard. Fine Arts and historical works are placed under the immediate superintendence of the Prefect of the Seine.

The Fine Arts Academy have proceeded to the election of the member who was to replace M. Bonassieux. As was predicted, M. Frémiet won easily, by 21 votes out of 35. M. Allar had three; MM. Langon, Coutan, Injalbert, and Cugnot had each two; and M. Tony Noël only one. The new Academician is one of the most brilliant of Rude's pupils. He was born in Paris in 1824, and bears his sixty-eight years well. He was first brought into notice by his models at the Ecole de Médecine of anatomical pieces, which were intended for the Orfila Museum. In 1843 he sent a gazelle to the Salon, which attracted much notice. Six years later he sent a wounded dog running, which is now in the Luxembourg Museum, and which is quite equal to any of the best works of Barye. Having been obliged to gain a living, to model and paint the zoological plates for the Museum of Natural History, he acquired in this work that accurate knowledge of animal anatomy which is a special feature of his work. His conceptions are all based on a scientific study of nature. Beside his marvellously truthful animal sculptures are also to be noted his numerous graceful statuettes in bronze and terra-cotta. But his leading works, those which establish him as an incontestable master in modern sculpture, are the Jeanne d'Arc in the Place des Pyramides (illustrated in the *Builder* for August 3, 1889) which he modified and altered for the town of Nancy; the Louis d'Orléans for the chateau of Pierrefonds, the statue of Condé at Chantilly, the "Velasquez" (of which an illustration appeared in these pages on July 5, 1890), and lastly the "Olivier de Clisson" exhibited this year at the Salon.* It may be mentioned also that M. Frémiet is now executing the monument to Raffet which is to form a pendant to that of Meissonnier in the "Jardin de l'Infante" at the Louvre.

The exhibition of "Arts de la Femme" has just been opened to the public. This exhibition, organised at the Palais de l'Industrie by

the Union Centrale des Arts Décoratifs, is under the management of M. Marins Vachon, a learned art-critic who has spared no pains to collect here everything in art industry which has been created purely for woman and made exclusively by women. The collection is very interesting, and among its attractions is a diorama by M. Polpot, in which, under the title "La Parisienne du Siècle," the author has represented the transformation from the fashions of 1790 to those of to-day.

We have to record the death of M. Frédéric Loewe Marchand, painter, at the age of 38. He had been a pupil of Pils and Luminais, and had devoted himself to historical painting and portraiture. He gained a third medal in the Salon of 1883 for his picture of "Belisarius," and a second medal in 1885 for his "Supplice d'un Prisonnier de Guerre," which was purchased by the State. At the 1889 Exhibition a bronze medal was awarded to this modest and sincere artist, who has died in the prime of life, much regretted by all who knew him.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

WE continue our report* by giving the proceedings at the last two sittings of the Commission, and embodying other evidence which we have had to hold over, but arranging it so as to bring together the evidence of witnesses speaking to cognate subjects.

The Thames Conservancy's Inspection.

Mr. Gough, Secretary to the Thames Conservancy, produced three voluminous tabular statements with reference to which he was examined at considerable length. The first was a list of towns, villages, and other places on the Thames and its tributaries above Staines, showing in columns the population, how many visits were paid by the inspectors of the Conservancy, whether any and what pollution had been detected, and what remedial measures had been adopted. This list extended to twelve sheets, brief size, containing over twenty-five names on each sheet. Some places were visited once or twice a week, some once or twice a month, some at longer intervals, and some had not been visited at all, owing to difficulty of access and want of time on the part of the officers. In many cases no pollution had been detected; in others it had been detected, and in most of these, but not all, it had been diverted. A second list contained the names of seventy-six places from which the passing of sewage had been stopped. Details were given in each case. The third was a list of twenty-two places where sewage works of a character more or less systematic had been executed with the details of such works. This table gave in columns the population, distance from river, extent of land, method of treatment, descriptive remarks, high and low levels of works and stream, topsoil and geological formation, and what becomes of any effluent. (The table was an amplification of one already presented and summarised in the *Builder* of June 23, p. 503.) The towns discharging effluents are Oxford Abingdon, Reading, Maidenhead, Chertsey, Cirencester, New Swindon, Old Swindon, Witley, Wokingham, High Wycombe, and Uxbridge. In other cases there is no effluent outlet and the liquid is absorbed.

In answer to questions, Mr. Gough said that in the summer the inspecting officers had many regattas to attend to, and were not able to devote so much time as in the winter to the work of inspection.

The Chairman: In other words, the inspection is less efficient in the summer than it is in the winter.

Mr. Gough: So far as it is done at all, it would be done as efficiently for a less time in the summer as it is in the winter.

The Chairman: Of course, the fact that there is less time devoted to it in the summer is perfectly well known to everybody concerned.

Several questions were put as to the manner in which the information embodied in the returns had been obtained.

The Chairman said: It really represents an inquiry undertaken for our benefit, in consequence of what took place when you were here before.

Mr. Gough: Yes, our former statement had

* See A. D. Bartlett's painstaking volume, *ad hoc*, 1890. It shows that the long account in the *Gentleman's Magazine*, 1821, is in many respects inaccurate.

* Of this work an illustration will appear in the next number of the *Builder*.

* See last volume of the *Builder*, pp. 418, 435, 456, 450, 503; and current volume, pp. 19, 20, 27, 71, 82.

been prepared hurriedly, and the levels had not been taken by observation.

He added that about 3,600 inspections were made in a year, and explained what was done in the way of giving notices and making complaints and representations before formal notice was resorted to.

Mr. Mansergh observed that, dividing the population by the acres, there were at Oxford 1 acre to 136 people; at Abingdon, 1 to 134; at Cirencester, 1 to 133; at Reading, 1 to 76; and at Maidenhead 1 to 530. The Maidenhead effluent was as good as that of Reading. An Oxford sample was found to be good, and one from Cirencester as good as the Thames water there.

Professor Dewar: Would the Conservancy accept 1 acre to 500 on laying out new farms?

Mr. Gough: If the Conservancy can keep the river fairly pure, and free from a bad effluent, it is hardly within their jurisdiction to decide on the extent of a sewage farm.

Some surprise was expressed by Professor Dewar at learning that not more than about two dozen analyses of effluents were made in a year, because analyses were costly; but Professor Dewar said they need not be if they were limited to the question of purification from organic matter.

It appeared that between 1887 and 1892 there had been fifteen adverse reports as regards Oxford, but of course many more inspections without such reports. Up to that moment he was not aware of the existence of Mr. Binnie's map of pollution, based upon the reports of Dr. Foshrope and Dr. Ashby.

The Chairman: The fact that your inspectors found certain places in the condition they describe is not inconsistent, is it, with their being in the condition which is described in these other reports which we have got at other times?

Mr. Gough: No, it is not, but, with some exceptions, our inspection has been pretty constant. What the other witnesses discovered were mostly cases of sloop pollution; they had very great difficulty in finding a higher kind of pollution.

The witness afterwards explained that inasmuch as a sewage notice gave a delinquent twelve months' grace, and further time was lost in proving continuous pollution, it was often possible to do more by courteous letters than by notice. Their own Act was better than the Rivers Pollution Act, and, with further powers and more funds, he believed they could accomplish all that was desired.

The witness handed in a correspondence between the Board and the Southwark and Vauxhall Company. The Board called attention to the fact that the figures in the report of Dr. Frankland showed that the Company had been drawing from the Thames more than the authorised 2½ million gallons daily. The Company simply said that, although the total supply had exceeded that, a large quantity had not been drawn from the river, and when the deduction was made the limit had not been exceeded. The Board asked for fuller explanations. The Company asked for an interview, which was granted. The last letter explained that the return made no allowance for loss, slip, or variation in the length of stroke of the engine. Further, a large amount of water was obtained from the "natural collecting works at Hampton," and a good deal of water used for sand-washing purposes was returned to the river.

Mr. C. E. Groves, F.R.S., handed in the results of the analyses of four samples of water taken from the Thames on April 21, 1892. The results were almost identical with those given by samples analysed last year; these samples, however, contained rather less free ammonia, and there was less of easily oxidisable organic matter as indicated by the permanganate test. Mr. Groves said he differed from Dr. Frankland by preferring the albuminoid ammonia process to the combustion process of Armstrong & Frankland, because the former differentiated between easily decomposable nitrogenous matter and the total nitrogenous organic matter, a portion of which might not be easily decomposable. Therefore the albuminoid process was more valuable if we wanted to ascertain whether the water was polluted to any extent. He did not agree with Dr. Frankland that the relative value of the oxygen determination was of more importance than that of the albuminoid ammonia. He was aware that in the case of London waters the relative oxygen was very nearly in exact pro-

portion to the relative amount of absolute carbon; but it was not the case with effluents. The oxygen required in an Oxford sample was 0.49, and in a Maidenhead sample 0.35; in the first the albuminoid ammonia was 0.5 parts per million, and in the Maidenhead sample .19; so that by the oxygen required the Maidenhead sample was the better, and by the albuminoid ammonia it was four times as bad.

Leut. C. E. Bell, R.N., the Conservancy's chief inspector of the river between Cricklade and Staines, described the methods adopted by him and his assistants in doing their work. The length of his portion of the main river was 130 miles. They looked out for water-courses likely to carry drainage and went up to the villages and houses passed by them. Sometimes there had to be a house-to-house visitation. They went completely round sewage farms, and if the effluents were turbid or smelt they took samples and sent them in with their reports. They also communicated with the persons in charge of the farms, and continued their visits even while correspondence was going on. Samples were not taken merely on account of "bad appearance," so that when that complaint was made of Reading in 1890, 1891, and 1892, no analyses were made. Winter was often the worst time on sewage farms, because floods were sources of danger, whilst when the ground was hard it did not absorb sewage. Although he was diverted from river work in June and July, his two river-keepers were not; he also had an assistant, and no one had any notice of visits of inspection. A clear effluent with a had smell would be reported adversely, but a clear effluent without smell would be reported as "no apparent pollution."

Mr. F. A. W. Drummond, assistant inspector under Mr. Little between Staines and Teddington, described the condition of things at Staines, where he had reported that a "feeble attempt" was made to deal with pollution by sewage. The pollution still existed. Drains discharged directly into the Thames, the Colne, and ditches that polluted the rivers. There have been regular and special reports of this pollution for ten years. The Conservators have served notices in 121 cases. In some, owners or occupiers have cut off the connection of their closets with these drains. In these cases action or notice may occupy thirteen months. He was afraid that the other duties of the officers interfered with a regular proper inspection.

The Lea Conservancy and Sewage Farms.

Major L. Flower, of the Lea Conservancy Board, having been asked in his original examination, by Professor Dewar, whether he could complete a table he had handed in, now produced an additional statement as to the disposal of sewage on land above the intakes of the water companies in the watershed of the Lea. The table shows (1) the population of the place, (2) the daily flow of sewage in gallons where it can be ascertained, (3) the area of the land employed, (4) the value of the soil, and (5) the height above the ordinary water-level of the river, and certain other details. In the following, we omit the column for the daily flow of the sewage, as it is ascertained only in three cases, and we give the nature of the soil with the descriptive remarks, but we give the population and the area in table form, because the proportion between them is often mentioned in the examination of witnesses:—

	Population.	Acres.	Height-ft.
1 Luton.....	30,005	94	20 to 200
2 Wheatthampstead..	2,319	4	10 to 12
3 Hatfield.....	4,650	unimproved	19 to 37
4 Whitwell.....	500	4	5 to 8
5 Buntingford.....	2,900	5	9 to 12
6 Hadham.....	1,308	4	8 to 10
7 Bishop's Stortford..	6,693	120	200 to 270
8 Harlow.....	1,900	7	4 to 8
9 Sawbridgeworth....	3,049	—	50 average
10 Stantand Abbots..	—	—	100 to 150
11 Ware.....	5,131	114	10 average
12 Hoddesdon.....	2,631	37	20
13 Brexbourne.....	1,099	9	13 to 15
14 Waltham Abbey....	6,006	12	10 to 15
15 Cheshunt.....	9,629	23	10 average
16 Royal Small Arms Factory.....	2,500	29	8 to 10
17 Epping.....	1,300	34	40

Daily flow of sewage in gallons: Luton, 1,250,000; Bishop's Stortford, 535,225; Cheshunt, 150,000; Wheatthampstead, very small.

1. Chalk. Pumping scheme; farm may be considered 80 acres; sewage absorbed in chalk; ½ of a mile from river; night sewage stored in tanks; overflow to ½ of an acre of land, planted with oysters, and to filter.

2. Light, porous, sandy. Gravitation scheme;

overflow of tanks absorbed in soil; small sewage-farm 60 yds. from river.

3. Loam and gravel. Gravitation scheme; land used intermittently, 50 acres at a time; 100 yds. from river.

4. Light soil on chalk. Gravitation scheme; overflow of tanks absorbed in soil; 30 yds. from river.

5. Light loam over gravel. Gravitation scheme; sewage absorbed in soil; close to river; some houses not connected with sewers.

6. Light gravelly soil. Gravitation scheme; effluent to the river Ash; close to river.

7. Gravel and sand over chalk and clay. Pumping scheme; 22 acres recently added to farm; part of the night-flow filtered; effluent to the Stort; ½ mile from river.

8. Peaty, well drained. Gravitation scheme; part of parish only sewered; provision for about 400 houses; many not connected.

9. Light loam. Gravitation scheme; chiefly absorbed in soil; ½ mile from river.

10. Light gravelly soil. Pumping scheme; farm laid out carefully since 1886; cause of complaint removed; 1 mile from river.

11. Drift gravel and sand. Pumping scheme; sewage absorbed in soil; close to river; about 70 acres used for sewage disposal, rest being flat land, adjoining river.

12. Free gravel. Gravitation scheme; sewage now well dealt with; absorbed in soil; ½ mile from river.

13. Light gravel soil. Gravitation scheme; sewage absorbed in soil; about 100 yards from the river.

14. Loam, sand, and gravel. Pumping scheme; effluent to Cobbins' Brook and Cholera Ditch, adjoins both; ½ mile from river.

15. Gravel and sand. Pumping scheme; effluent to intercepting drain of East London Waterworks, discharging into the river.

16. Loam, sand, and gravel. Pumping scheme; effluent to back river at Esfield Lock; close to river.

17. Loam. Gravitation scheme; sewers are constructed for a special district with two outfalls,—one in Lindsay-street (drained 4 ft. and 5 ft. deep), the other on Sleaford Farm, and used by the tenant on his land; 200 houses connected to sewers, each outlet taking about half.

In answer to Professor Dewar, Major Flower said that there were seventeen places which disposed of their sewage under a certain system on land. There were small places which disposed of it without any system, by pouring slops on the ground. He had excluded Hertford, which treated its sewage chemically in tanks, and Welwyn, where it was treated in tanks and filtered through straw, and had confined the list to land treatment, with or without chemical treatment. To Mr. Mansergh he said there had been much misunderstanding about Wheatthampstead; it was a very small place; the flow of sewage was very small, and it was collected in two tanks, 70 ft. in length, and 9 ft. in breadth. There is no public water supply, and there are very few water-closets. The small sewage farm has sometimes been called a sewage garden. There is a small barrel of lime; lime-water is used to keep the smel down, although it really increases it. At the Small Arms Factory and Epping there are no tanks, only pumping wells and screening chambers; and no chemicals are used. Many of these places are near the river; but care is taken to keep the water out of the river; it all passes through land. To Sir G. Bruce he said that treatment by land was far superior to treatment by chemicals. Where chemical processes are employed the river is reached by contamination such as you do not find when land is used. All that was mentioned in this return was practically a fair and effective treatment of the sewage on the river. In the way of keeping mischief from question in the way of keeping mischief from the farm; it was entirely absorbed in the soil. Some houses were connected with cess-pools only, and he was trying to get all the houses connected with the sewers. At Hadham there is a visible effluent which, as a rule, is very fair. There is a great difference in the areas of land for these places; but in each case it is sufficient. Hoddesdon has pure sewage land not now used for cultivation, and the sewage is allowed to soak into the ground. Professor Dewar pointed out that Wheatthampstead, Whitwell, and Hadham had all the same areas for different populations; and the witness said that at Wheatthampstead perhaps no more than 1,000 people drained into the sewers, and the rest of the sewage was disposed of in detail. Therefore, the table did not support any inference as to the area of land to be needed for a given number of people in all cases.

Professor Dewar said he was under the

impression that the table would enable them to come to a judgment as to the number of persons whose sewage could be disposed of on a given area; but the witness said, it would not. In the cases of Stanstead Abbots and Waltham Abbey, one having five times the population of the other, the disposal of the sewage on equal areas was equally satisfactory. In answer to Sir A. Geikie, the witness said that Luton was the only place where he had observed springs issuing from the chalk below the level of the sewage farm and the stream. Analyses showed that there was no appreciable injury caused to the spring by the disposal of the sewage by absorption in the chalk. The distance between the sewage farm and the issue of the spring was over half a mile, but there was a piece of land 100 yards from the spring on which sewage was sometimes put and allowed to soak.

The Sewage of Hertford.

Mr. C. E. Longmore, Town Clerk of Hertford handed in several statements on behalf of the Corporation. One by Mr. Longmore recited that in 1884 the Lea Conservancy sought to obtain an injunction to restrain the Corporation from discharging their effluent into the Lea. After a long hearing and inspections, Mr. Justice Watkin Williams gave judgment that no real injury, pollution, or nuisance was caused, that the effluent could not be injurious to the consumers of the water supplied by the East London Company, and that the objection, therefore, is a sentimental one, and if it is removed it should be at the expense of the Company,—a principle recognised by the New River Company, who commenced negotiations with a view of taking over the treatment of the sewage of that town. The Corporation have had the effluent analysed several times by the late Dr. C. M. Tidy, Dr. Thomas Stevenson, and Dr. Turner. Schedules showing the results of these analyses were annexed. The Corporation strongly object to any greater quantity of water being taken by the Companies from the Lea Valley, and upon this branch of the case entirely support the action of the Hertfordshire County Council. In his examination Mr. Longmore said towns ought not to be rated to keep up the rivers to the standard of drinking water for London. The town took its waters from deep wells which belonged to the Corporation. There had not been any complaint about the lowering of the water in these wells. The New River Company spent a considerable sum in sewerage Hertford and in constructing the works, and would object to have any land in the neighbourhood used for casting the sewage over it. The work was done under an Act of 1854. Mr. Hill said "It is a curious arrangement," and the witness said the reason for it was that the sewage used to go more or less directly into the River Lea above the intake of the New River Company, but by constructing these works they got the sewage of Hertford treated, and ensured the discharge of the effluent below their intake. Still the town had no right to discharge an effluent which would be a nuisance at common law.

Dr. Thomas Stevenson, Scientific Analyst to the Home Office, made a statement, in which he said he had often been consulted since 1883 by the Corporation of Hertford as to their system of sewage purification, and he had repeatedly visited the works, and taken samples of the effluent. He invariably fixed his own time for the visits, and he gave evidence on behalf of the Corporation at the trial before Mr. Justice Watkin Williams in 1884. He was acquainted with the analysis of Dr. Tidy, which showed the effluent to be a very good one. Dr. Tidy's analysis of the Lea water above and below the sewage outfall showed the difference in quality to be but slight. The precipitation process used at Hertford was one of the best that is known. The resulting effluent is good and highly dilute, and, except for the very faint odour produced on agitation, it might often be mistaken for a drinking water. Samples kept well without showing putrescence. In the Cut a visiting-card could be read at a depth of 3 ft. The blackness at the bottom of this Cut and of the mud of the Manifold Ditch was due partly to the use of green vitriol in the precipitating process and partly to the peaty soil through which the ditch flows, and is of no consequence. On looking at the mud through the colourless water, the water had a deceptive appearance of blackness. He had never been able to detect sulphuretted hydrogen in the

effluent or evolved from the Cut. The nearly invariable presence of iron salts must prevent the evolution of that gas. The effluent might be safely run into any river of sufficient volume, such as the Lea, where the effluent becomes diluted with fifty times its volume of water. The effect on the river is insignificant, and all appearance of sewage quickly disappears below the outlet of the Manifold Ditch. The effluent could not appreciably effect the river fifteen miles lower down. Sewage fungus merely affords evidence that the conduits contain sewage effluent. The fungus is *per se* inodorous. It appropriates the sewage constituents as part of its tissues, and, if uprooted, it dies and decomposes. Among the products of its decomposition are sulphur compounds, but, in the presence of dissolved iron salts in the faintly alkaline water, there can be no evolution of sulphuretted hydrogen. There is, however, a formation of black sulphide of iron, a substance which gradually oxidises without evolution of sulphuretted hydrogen, and without offence. The small amount of sewage fungus which goes into the Lea cannot harm the stream a little lower down. The only possible danger attendant on the admission of the effluent is the introduction of specific or pathogenic organisms. There is no evidence, however, that these organisms can survive large dilution, the influences of light, oxidation, and a flow of more than a dozen miles in a river. Hence, he apprehended no danger to the filtered London water supply, from the introduction of the Hertford effluent into the Lea.

In examination, Dr. Stevenson said he had been consulted during the last ten years by the Corporation of Hertford as to their system of sewage purification. He handed in some tables of analyses for the years 1883-86 and 1891. The treatment was precipitation and transmission through a cut with exposure to air before discharge into the river. The manager would vary at his discretion the usual proportions of 3 to 5 grains of the mixed sulphates and about 10 grains of lime. The peculiarity of the effluent was its high dilution, brought about by the infiltration of subsoil water into the drain. The sewage was diluted with something like ten times its volume. The mud of the Manifold Ditch was undoubtedly black, but the blackness was due to the presence of the sulphide of iron. The surrounding soil is black, somewhat peaty, and yielded traces of sulphides. It evolved sulphuretted hydrogen when treated with acids. The soil taken from the ditch had not the bad smell described. The fungus was always associated with a large proportion of sewage, but it was not confined to sewage. He had not met with the same fungus in England, because he knew of no watercourses containing sulphuretted hydrogen in the water. That may be produced by the decay of the fungus; it grows in waters that are fairly pure organically, but contain sulphur compounds. In this country it was generally found associated with a contaminated stream. When the fungus decayed, it produced sulphuretted hydrogen, and increased that form of pollution, unless there was something in the water which restrained the evolution of sulphuretted hydrogen,—iron, for instance. After the treatment of the Hertford sewage, there was sufficient iron left in solution to prevent the evolution of sulphuretted hydrogen. Only once had he failed to detect the presence of dissolved iron in the water of the cut right away down to the weir, where it fell into the ditch. The most effective way of treating sewage was to precipitate, and then filter through land, but there were difficulties in doing that at Hertford, one of them being the contiguity of the deep wells of the New River Company. It was doubtful whether pathogenic organisms would survive a run of 15 miles down to the intakes of the companies. He did not think the effluent interfered with the wholesomeness of the water. He preferred land treatment if it were practicable; but he did not see where land was to be had near Hertford at a lower level.

Dr. Geo. Turner, Medical Officer of Health for the borough of Hertford, submitted a statement in which he said that his analysis showed the effluent to be a good one. The sewage after it reached the sewage works was mixed with alumina, sulphate of iron, and milk of lime. He described the process and said that long acquaintance with the works had convinced him that the treatment at Hertford was a good one, and gave a good effluent. In examination he said he agreed with Dr. Stevenson that the precipitation process would

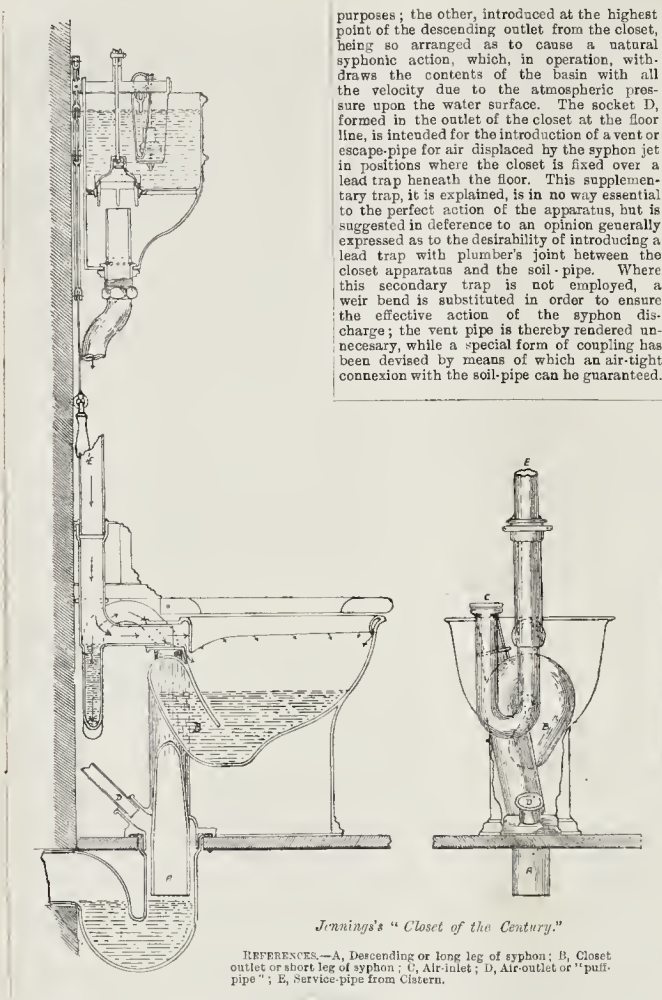
be more efficient if it were not for the infiltration of the subsoil water, and also that land treatment in addition would give greater guarantee of purity. But that would be very difficult at Hertford, on account of the springs. The low-lying land would not answer the purpose, and the high land would be objectionable on account of the expense of pumping the sewage.

Mr. Urhan A. Smith, C.E., of Westminster, who had acted for the Conservancy, gave a description of the Hertford Works in which he stated that, whilst the quantity of sewage discharged in a day was 2,362,982 gallons, the quantity of water used was 208,235 gallons, so that the sewage was diluted with 2,154,747 gallons of spring water. These figures represented the dry-weather flow. This was greatly increased in towns of heavy rainfall. In his examination he said the tank capacity was equal to one-sixth part of what had to be dealt with, so that it was very difficult to deal with a heavy rainfall. To divert the subsoil water from the sewers and deliver it into the river would involve the re-sewering of the whole town.

Mr. James Cramp, manager of the Hertford Works, said that in a week there were used 186 lbs. of alumina, as much lime, and 68 lbs. of iron. The precipitate was removed from the tanks about once a fortnight, and fetched away by farmers in its unfressed condition of sludge. If it were pressed, it would be more easily lifted. The coke filters through which the effluent passed had to be washed out once in three weeks. For himself he should like the surface water taken out. No complaints of the works were made to him.

The Flow of the Thames.

Mr. C. J. Moore, C.E., Engineer of the Thames Conservancy, handed in a diagram on which was shown the daily average discharge during each month in the years 1883 to 1891 at Teddington, also the daily average quantity abstracted by the companies, and the rainfall in the Thames Valley for each month. It appeared from Mr. Taylor's gaugings (Transactions Civil Engineers) that from 1853 to 1873 the average discharge at Seething Wells was 800,000,000 gallons. For the twenty-eight years in these tables it was 857,500,000 gallons. The Water Supply Commission of 1867 had a table put by Mr. T. H. Harrison for eleven years, 1855-66, showing a daily discharge of 1,352,000,000 gallons. Mr. Taylor's figures for the same years gave 788,000,000 gallons. Mr. Bateman by measurement above the waterworks in September, 1865, arrived at a gross average scarcely exceeding 300,000,000 gallons. Mr. Hawkesley, by measurement at Bray Lock in 1851, after drought, arrived at 200,000,000 gallons = 72,800 gallons per square mile for 2,747 square miles, representing at Teddington, for 3,766 square miles, 274,000,000 gallons. In 1887, Teddington gaugings were 17,96,000,000 gallons, and companies' takings 101,000,000 gallons, = 280,000,000 gallons. The discharge at Teddington is during dry seasons nearly always lowest on Mondays, because on nearly every reach of the upper river there are mills, which utilise the head of water held up by the weirs. Most of the mills work continuously day and night throughout the week, and the effect in dry weather is to draw down the level of the water from 1 ft. or 2 ft. below the Standard Head Water Mark. When they shut in at mid-night on Saturday, the water in the upper reaches begins to rise, and until it has reached the Head Water Mark the downward flow is to a great extent intercepted. The effect of this is not felt at Teddington until Monday. Mr. Moore said that to some extent the discharge followed the rainfall; but it was difficult to follow. The number of days between maximum rainfall and maximum discharge varied a good deal, according to the season and the condition of the land when the rain fell. If the ground was already saturated the effect would be felt the same day. The Act said that a miller was to have as good a head of water as he had when it was passed. At the reach there is a Standard Head Water Mark up to which the water is kept, subject to the action of the mills. When they stop the water begins to rise. While it is rising the flow is intercepted to some extent, and the filling up of the reaches keeps the water away from Teddington. The mills are in almost every reach of the river above Windsor. The millers do not shut the weirs; that is done by the Conservancy's officers. In conclusion Mr. Mansergh said the Commission



Jennings's "Closet of the Century."

REFERENCES.—A, Descending or long leg of syphon; B, Closet outlet or short leg of syphon; C, Air-inlet; D, Air-outlet or "pull-pipe"; E, Service-pipe from Cistern.

would meet Mr. Moore at the weir, and that would be better than talking about it in the room.

We are obliged to hold over until next week evidence as to the flow of the Lea, and evidence tendered on behalf of the County of Kent, Metropolitan E-sex, the County of Surrey, the County of Middlesex, the County of Buckingham, and the County of Hertford, together with some statistics of population and supply.

NEW SANITARY APPLIANCES.

MR. GEORGE JENNINGS, of Stangate, Lambeth, has just brought out a new and improved form of syphonic discharge water-closet (Jennings & Morley's patent). It is somewhat awkwardly named "The Closet of the Century," but it is much better than its name, as it has succeeded in solving the problem of having practically all the advantages of a valve-closet without the mechanism of that apparatus. As will be seen by the accompanying section, the basin holds a good body of water, 6 in. in depth, with a surface area of 12 in. by 10 in. The closet is syphonic in action, and has a seal of 3 in. of water, instead of the usual seal of about half that depth. The action of the closet will be made clear from the accompanying section. It will be seen that the down service-pipe E from the flushing cistern has two points of connection with the closet apparatus: one to the perforated rim, providing the ordinary supply to the basin for cleansing

purposes; the other, introduced at the highest point of the descending outlet from the closet, being so arranged as to cause a natural syphonic action, which, in operation, withdraws the contents of the basin with all the velocity due to the atmospheric pressure upon the water surface. The socket D, formed in the outlet of the closet at the floor line, is intended for the introduction of a vent or escape-pipe for air displaced by the syphon jet in positions where the closet is fixed over a lead trap beneath the floor. This supplementary trap, it is explained, is in no way essential to the perfect action of the apparatus, but is suggested in deference to an opinion generally expressed as to the desirability of introducing a lead trap with plumber's joint between the closet apparatus and the soil-pipe. Where this secondary trap is not employed, a weir head is substituted in order to ensure the effective action of the syphon discharge; the vent pipe is thereby rendered unnecessary, while a special form of coupling has been devised by means of which an air-tight connexion with the soil-pipe can be guaranteed.

the bottom of the first compartment, and in connexion with this passage a valve is provided. The second compartment is of a capacity to contain the maximum quantity of water which it is desired to deliver at one action of the apparatus. This compartment has in the bottom a delivery passage of large area, and this also is provided with a valve. Immediately beneath the second compartment is the third compartment, and this is of a capacity to contain sufficient water for an after-flow. This third compartment is provided with an outlet valve immediately beneath the valve of the second compartment, and the lower valve has a passage of large area through it continued up to such a height that when the valve is on its seat the after-flow compartment can be filled. These valves are all closed by their own weight; they have rods connected with levers adapted to be acted upon by tappets upon an axis. The rod of the main delivery valve or that which allows the water to pass out from the second compartment is hollow, and the rod of the after-flow valve passes up through it. The axis before mentioned is partly rotated, when it is desired to bring the apparatus into action, by a pull-wire or other connexion, and afterwards a counter-weight causes it to return. The action of the apparatus is as follows:—When the axis is turned by the pull-wire or other connexion, the tappets first permit the valves in the first and third compartments to drop to their seats, so that now no more water can pass into the second or main flushing compartment of the apparatus, and the after-flow compartment is ready to retain water within it. Immediately afterwards the movement of the axis causes the main flushing-valve to be opened, and water rushes rapidly out of the main compartment. Some of the water passes down by the passage through the after-flow valve, and this forms the main flushing supply, whilst the remainder of the water missing this passage is retained in the after-flow compartment. On the pull wire or other connexion being released the axis returns to its original position, the after-flow valve then lifts, allowing the after-flow water to pass away, so that (the apparatus being used in connexion with a water-closet) the after-flow water enters the pan after the pan-valve has closed, and it there remains. During the return of the axis, also the main flushing-valve closes, and the valve by which the second compartment fills opens, and allows water to pass into it from the first compartment, to which a further supply comes from the main.

ARCHAEOLOGICAL SOCIETIES.

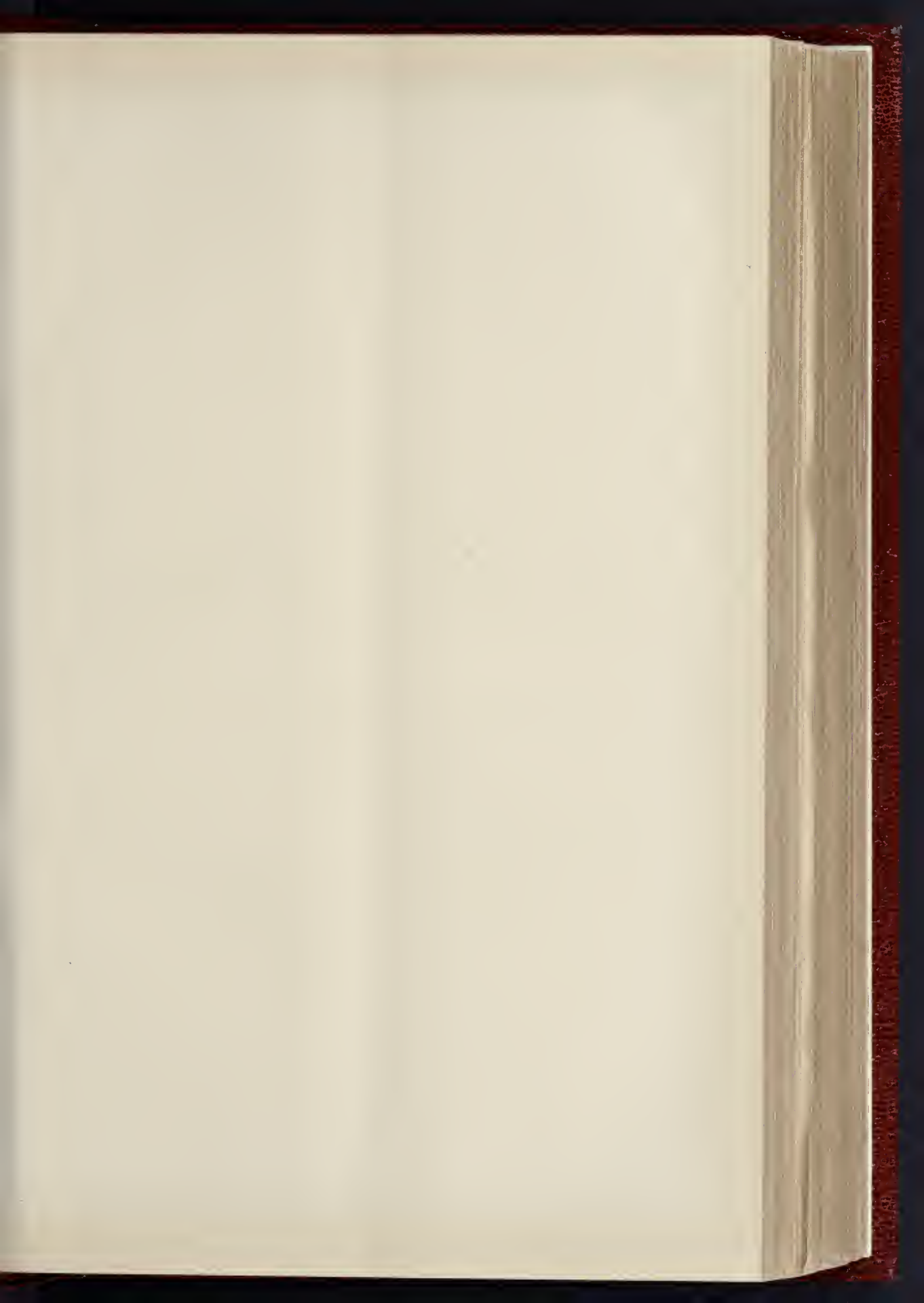
CAMBRIAN ARCHAEOLOGICAL ASSOCIATION.—The forty-seventh annual meeting of this Association is to be held next week at Llandello-Pawr, Carmarthenshire. It will commence on Monday and will be continued on the four following days. Among the places to be visited in the course of the excursions are Talley Abbey, Castell Carreg, Carn Goch, and Llandoverey.

ROYAL ARCHAEOLOGICAL INSTITUTE.—The annual congress of this Institute commences on Tuesday next, at Cambridge.

BRITISH ARCHAEOLOGICAL ASSOCIATION.—The forty-ninth annual congress of this Association is to be held at Cardiff this year, from Monday, August 22, to Saturday, August 27. The programme of places to be visited and of papers to be read is full and varied.

KENT ARCHAEOLOGICAL SOCIETY.—The annual meeting of this Society was held at Dover a few days since. The thirty-fifth annual report, which was adopted, stated that the Society was still in a prosperous state. During the year the Society had lost by death and other causes many old and valued members, but their places had been filled by new members. Twenty-one new members had been elected during the past year, while several were awaiting election. Reference was also made to the retirement of Canon Scott Robertson from the editorship of *Archæologia Cantiana*, and it was also stated that the Rev. Canon Rontledge had kindly undertaken the duties of honorary editor. The financial position was such as left nothing to be desired, the balance in hand at the present time amounting to 800*l.* 9*s.* 5*d.*

INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.—We are obliged to hold over until next week the continuation of our report of the Bury meeting of this Association.



THE BUILDER, AUGUST 6, 1892.

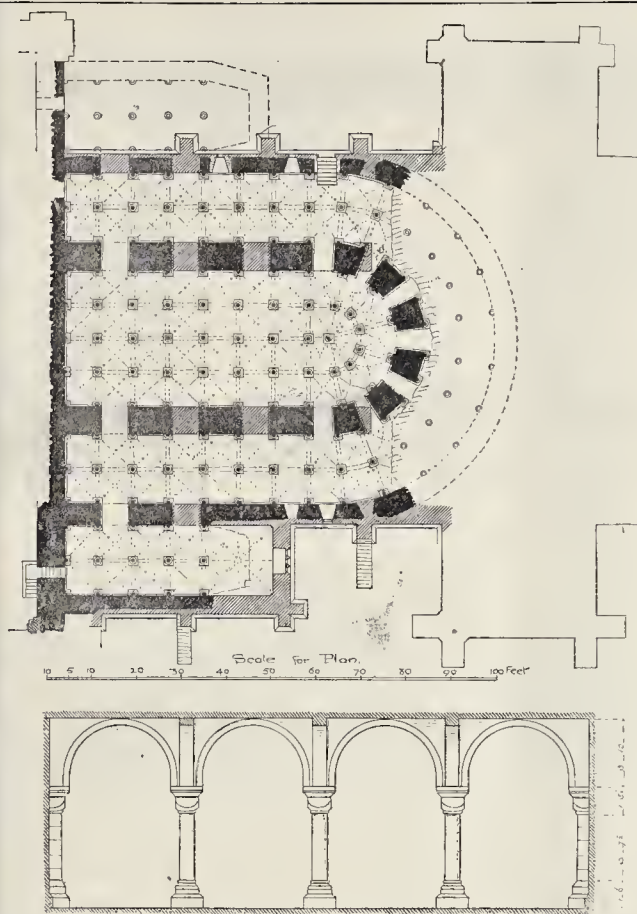




THE PHOTO BY BROUQUE & CO. 43, EAST-INDIAN STREET, BATTERY, S.E.C.

Cathedrals of England and Wales.
No. 20. WORCESTER, FROM THE NORTH-WEST.—DRAWN BY MR. BERESFORD PITE, A.R.I.B.A.

B.P.



Worcester Cathedral: Plan and Part Section of Crypt. Measured and Drawn by Mr. Harold Brakspear.

Illustrations.

WORCESTER CATHEDRAL.*

ST. WOLFSTAN of Worcester, the founder of the Norman Cathedral, is recorded by William of Molmesbury to have burst into tears while watching the pulling down of the earlier Saxon church built by St. Oswald, exclaiming, "We wretched ones destroy the works of the saints." Apart from the question of inferiority in architectural design, which did not form the basis of St. Wolfstan's regret, his words might find an echo in the consciences of cathedral architects of our own day, professional and amateur, at Worcester and elsewhere. The rebuilding of both the east and west fronts of the Cathedral, for the mere purpose of consistency in style, and the abrogation from the choir and Lady Chapel of later features than those of the ordained period of Early English, as "debased," as well as the demolition of the magnificent Guesten Hall, form a record sufficient to justify reasonable regret.

It, however, says much for the architectural value of the Cathedral, besides qualifying censure upon its restorers, that it still remains a building of marked beauty and interest. Professor Willis, who was carefully optimistic about the doings of his contemporaries, wrote in 1863, before the choir was "restored," that of "Great English cathedrals and conventual churches it is inferior to very few in interest and value, when considered with respect to the

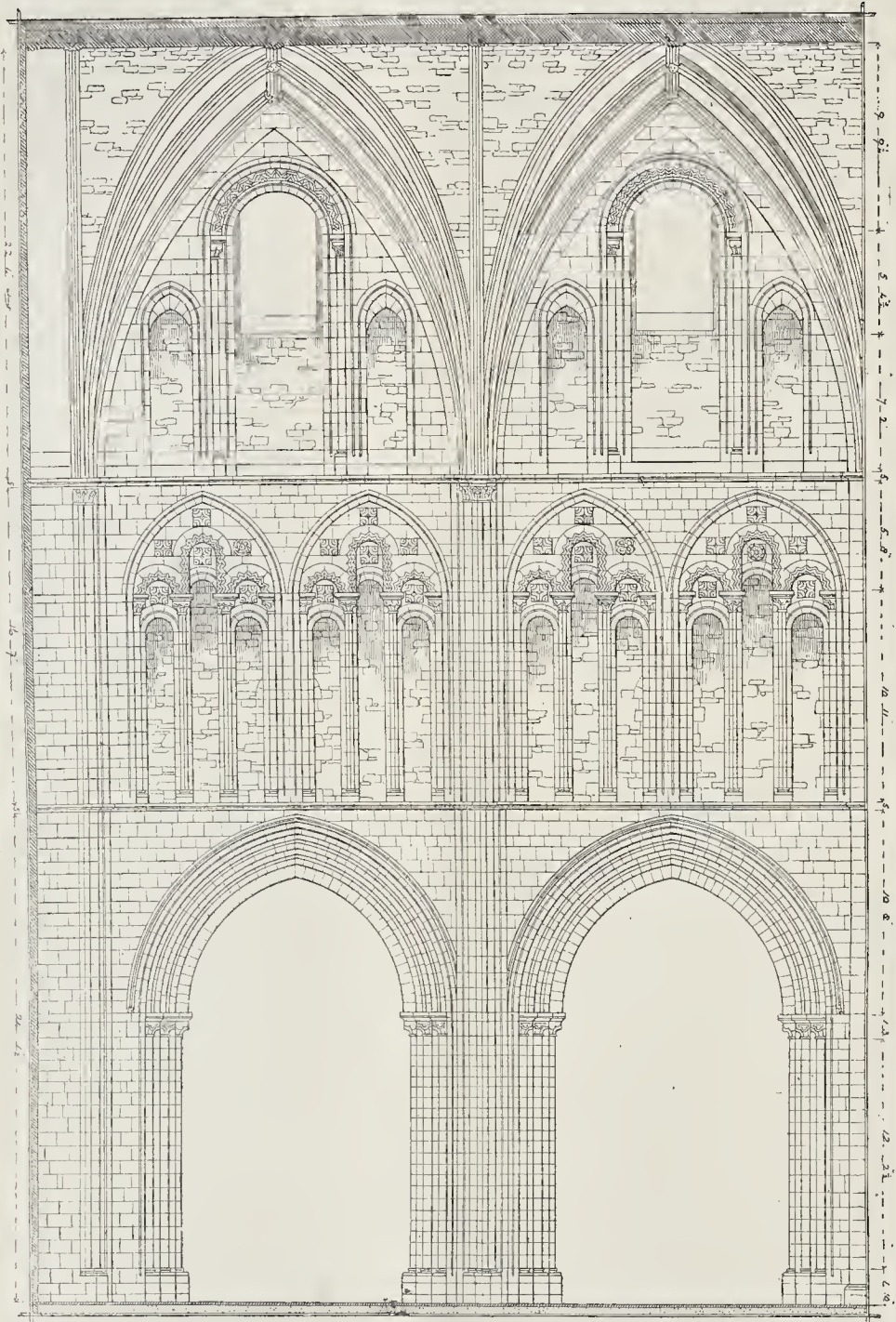
history and practice of mediæval architecture;" and, adding the words "and of restoration in modern times," we may adopt his opinion.

The See of Worcester was founded in the seventh century, and St. Dunstan of Canterbury was among the early holders of the bishopric. He was succeeded by St. Oswald, who founded a Monastery of Benedictines, into which he absorbed the original secular canons of the Cathedral, and erected the Church of the Virgin, removed for a grander edifice by St. Wolfstan. The latter saint was the last of the Saxon bishops, and a man of sufficient character and power to be recognised by the Norman conquerors, whose two kings he faithfully served until his death in 1095. An interesting link with the Saxon church exists in the design of the balluster columns of the wall arcade of the slype, which, if not themselves relics re-used from St. Oswald's Church by Wolfstan, are of marked Saxon character and distinct from the other Norman work. He began the erection of the Cathedral which we now see in 1084, and it was sufficiently advanced in 1088 for the monks to enter into. In a document of Wolfstan's, dated May 20, 1089, he incidentally reveals some of the first principles of mediæval architects in stating that he added to the monastery by "the construction and ornamentation of a church ("ecclesiæ constructione et ornamento"). In simple constructive beauty apart from ornaments, which at that period were archaic and crude, the crypt, with its twelve vaulted aisles and apses, and the impressive circular-vaulted chapter-house of his immediate successors, which remain to us, are unrivalled; the crypt being the most perfect of the four Norman ones,—Winchester, Gloucester, and Canterbury, are

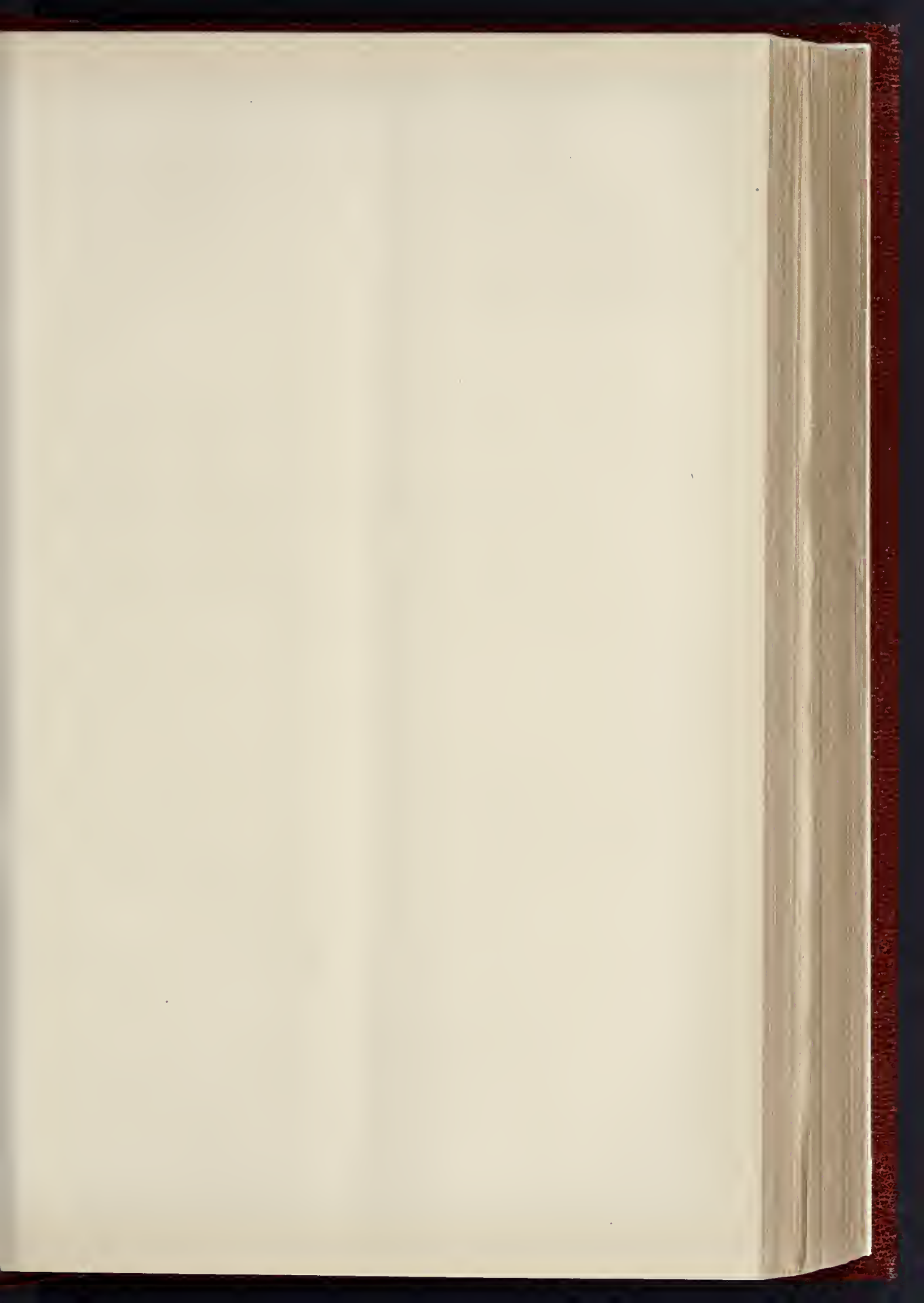
the three others,—both in proportion, and completeness of design, and the chapter-house being the patriarch of the subsequent polygonal ones so characteristic of English mediæval design. The crypt occupies the space beneath the present choir, and with its apse defines the Eastern limit of the Norman church. It is uncertain whether a lady-chapel then existed further eastwards or not. The width of the church was not varied later, and the nave extended to the full length of the present church, the south-west entrance to the cloisters marking the limit. The pier of the central tower, now cased with fourteenth century work, the walls of the great transepts, the north and south aisle walls of the nave, the slype abutting on the south transept, and the basement of the refectory on the south side of the cloister, with the south-east entrance adjoining, all indicate that Wolfstan's Cathedral, west of the choir, was co-extensive with the present church. Besides the crypt, slype, and undercroft of the refectory, the Early Norman remains are fragmentary though unmistakable, two fine arches in the east walls of the transepts exist, which opened into chapels now destroyed, that on the south replaced by an Early English building, into which the Norman arch now opens. An Early capital protrudes from the south-east pier of the tower in the choir aisle, and Norman masonry shows in the north-east pier in the triforium. Another capital is in the east bay of the north aisle of the nave, and in the same wall the Norman columns and caps of the north door remain. Upon the opposite side five large simple and un-moulded semi-circular headed recesses exist for altar tombs, and two Early Norman vaulting shafts mark the junction between the re-building of Wolfstan's nave in the Early English period and the transitional Norman work of the two westernmost bays. A characteristic of considerable beauty in the earliest Norman work, which is not found in that of the later period, is the use of two building-stones of varied colours in horizontal bands, as in Early Italian marble masonry. One stone used was the creamy-coloured oolite from Bath, and the other a grey-green stone from Higley, on the Severn. In the subsequent work a red sandstone was largely employed, and a fine general effect of warmth of tone and variety obtained. Two circular stair turrets, of the Early Norman masonry, project into the western angle of the transepts in an unusual but picturesque manner, and afford a very favourable surface for the banded masonry.

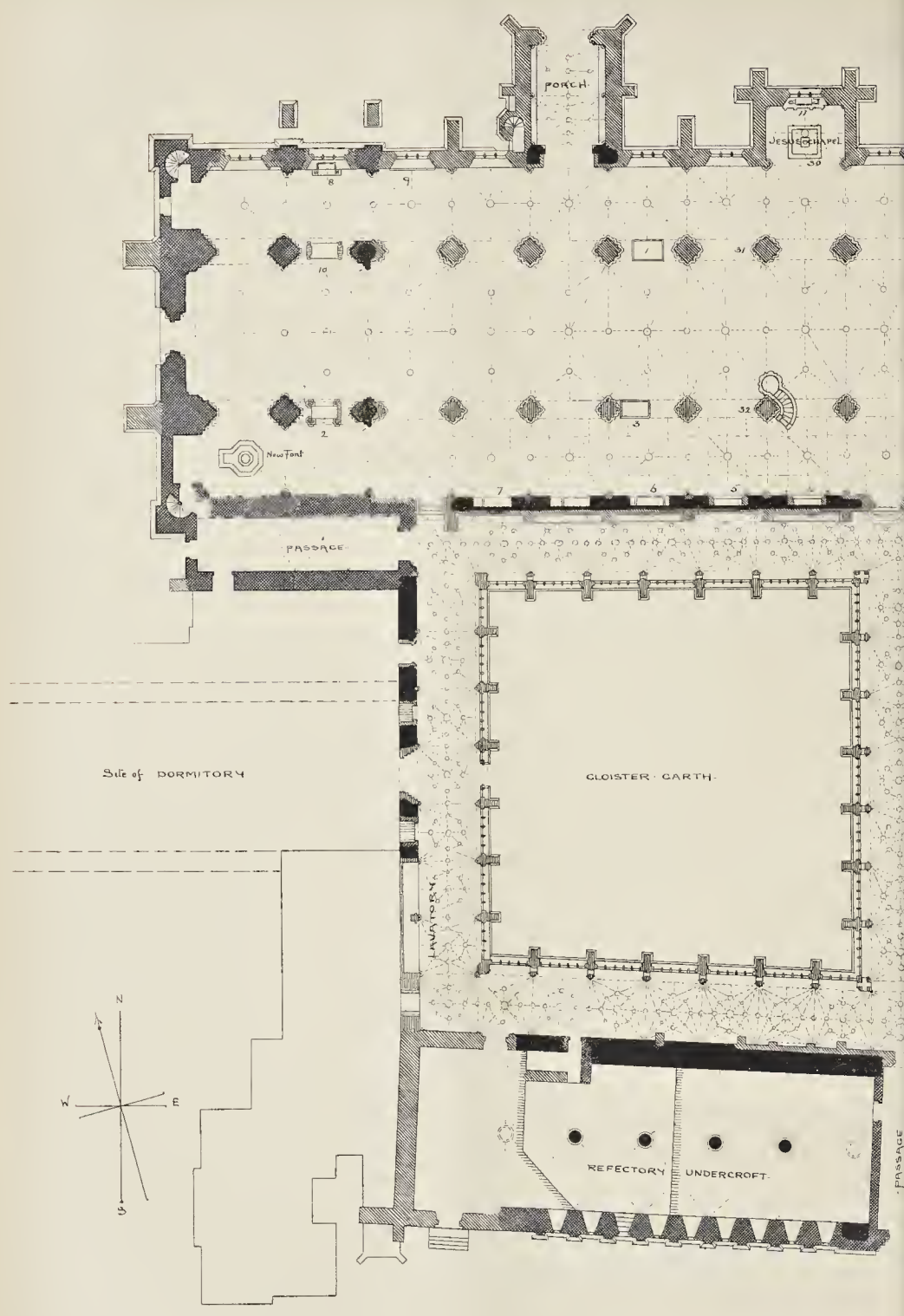
Wolfstan held a synod in the crypt in 1092, and it is interesting to recall the fact of the original use of the apse in the early basilicas for this purpose, to which the plan was adapted, and not for the purpose of the sacrum or chancel, for which it offers no accommodation or convenience. The apse of the crypt, and of the presbytery above, had seven radiating bays, with concentrating vaults upon the inner arcade and central column of the crypt, the width of the presbytery being subdivided below by three ranges of columns and vaults into four aisles, the aisles above, with a central range, and also the north and south chapels opening from the transepts, making in all twelve vaulted aisles in the crypt. The northern chapel and the outer aisles of the apse have disappeared, but the construction of the early vaults, as also in the slype and chapter-house, is perfectly sound to-day. The chapter-house, which is slightly later than Wolfstan's work, has a lofty central column, with a simple splayed capital and circular abacus, from which the vault, divided by boldly-moulded ribs into ten bays, springs; two tiers of wall-arcading surround the walls, the lower recessed for seats, and the upper of a simple interlacing type. Perpendicular windows have replaced the Norman ones, and in the same period the exterior walls were squared from the Norman circular plan into a decagon with angle buttresses. The two western bays of the nave are of the latest type of Norman, in which pointed and round arches are both used. The ground story is almost sufficiently advanced in type of moulding and carving to be called Early English, with fully pointed arches, but the triforium which is of two bays, within severe pointed enclosing arches, encloses small arcades of round Norman arches, ornamented with a simple zig-zag, and curious rosettes arranged upon the tympanum. The clearstory also divides the round and pointed styles without mingling them, it consisting of a central wide round-arched opening, with Norman ornaments

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 8, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page 118.



Worcester Cathedral: Interior Elevation of Two Western Bays of Nave. Measured and Drawn by Mr. Harold Brakspear.





Site of DORMITORY

CLOISTER - CARTH.

POKCH

JESUIT CHAPEL

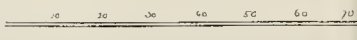
PASSAGE

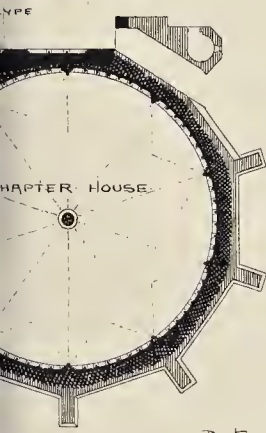
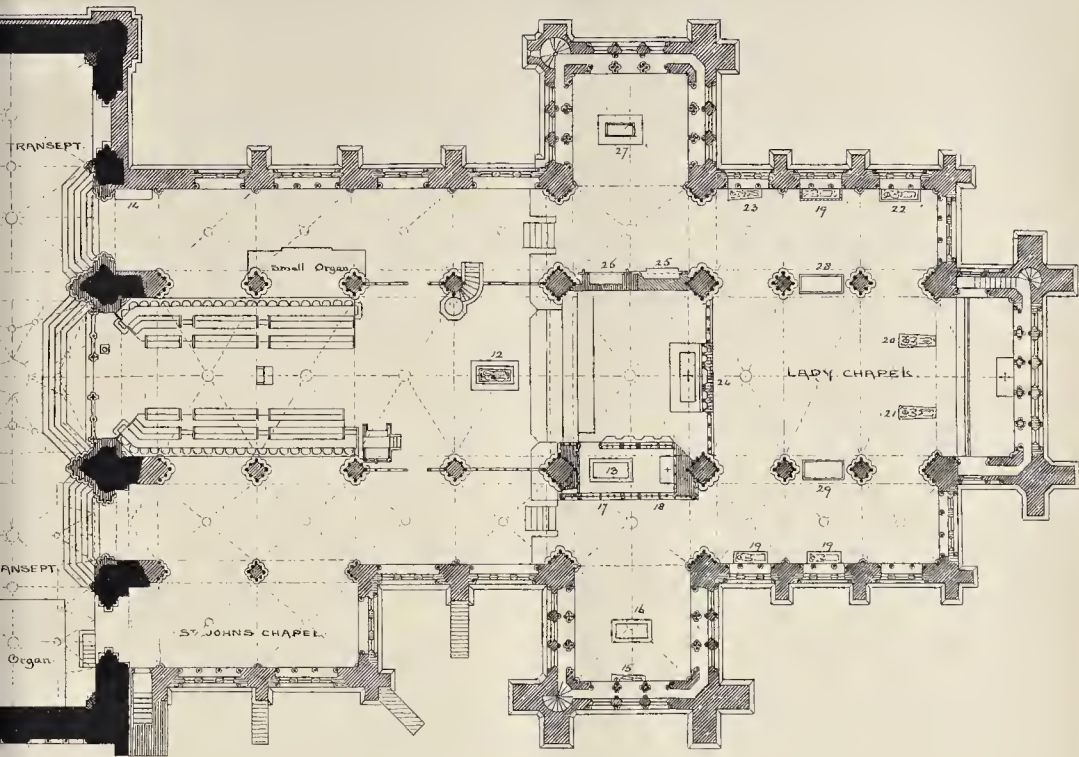
New Tomb

LAVATORY

REFECTORY UNDERCROFT

PASSAGE





Dates.

- Norman. 1084-1100 Bishop Wulfstan
- Norman. later
- Transitional c. 1150 Bp John de Payham.
- Early English c. 1216 + seq. Bp Silvester.
- Decorated Bps De Blois, Gifford & Cobham.
- Perpendicular Bps Lynn & Wakefield +
- Modern (Siggles)

MONUMENTS &c. &c.

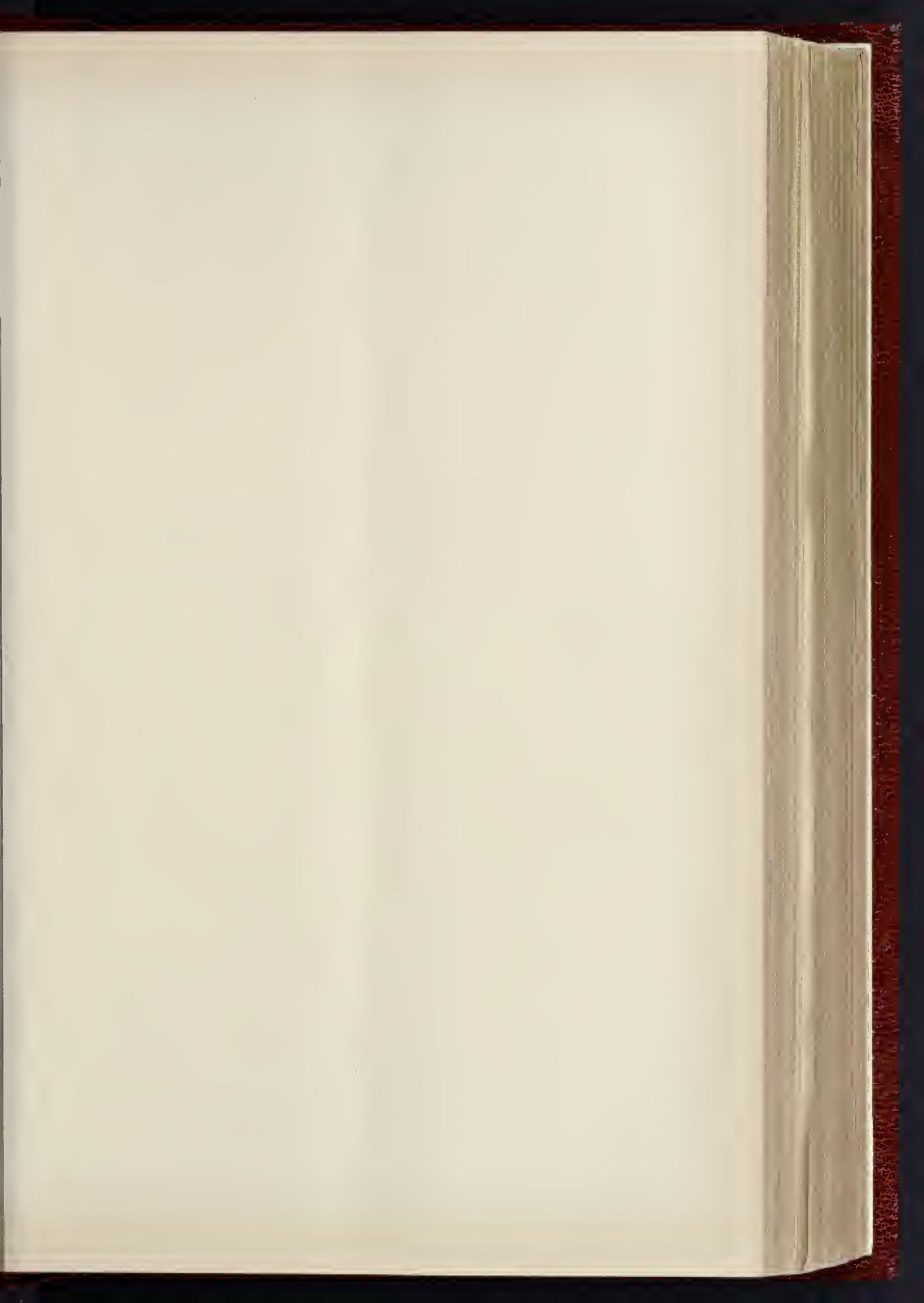
- | | |
|--|---|
| 1 Sir John Beauchamp & Lady | 17 Bishop Giffard 1302. |
| 2 Richard Edes Dean 1804 | 18 Lady Giffard of Bromsfield ? |
| 3 Robert Wild Esq's Lady. 1607 | 19 Effigies of Ladies unknown. |
| 4 A prior late 16 th cent. | 20 Bp William de Blois. 1236 |
| 5 Bishop Perrie. 1616 | 21 Bp Walter de Cantilupe 1265-66. |
| 6 Sir J ^r Lystleton of Frankly 1481 | 22 Bp Brian ? 1361. |
| 7 Bp Edmund Freake 1593. | 23 Sir James Beauchamp 13 th cent ^y |
| 8 Wife of Bp Goldsbrough of Glaster 1613 | 24 Abbot Hawford of Evesham & Dean 1557. |
| 9 Moore Family. | 25 Bp Cobham ? 1327 |
| 10 Bp Thornborough 1614. | 26 Bp Wulfstan de Bransford ? 1249. |
| 11 Bp Dullingham. 1576. | 27 Lady Elizabeth Digby. 1820. |
| 12 King John. 1216. | 28 Baron Lytton 1876. |
| 13 Prince Arthur & Chapel. 1502 | 29 William. Earl of Dudley 1885. |
| 14 Bp Maddox 1759. | 30 Old Font 1770. |
| 15 Sir William Harcourt 1209. | 31 Site of St John Baptist Altar. |
| 16 Sir Grygylth Ryce. 1523 | 32 " Holy Cross Altar. |

WORCESTER CATHEDRAL

GROUND PLAN.

100 150 200 Feet.

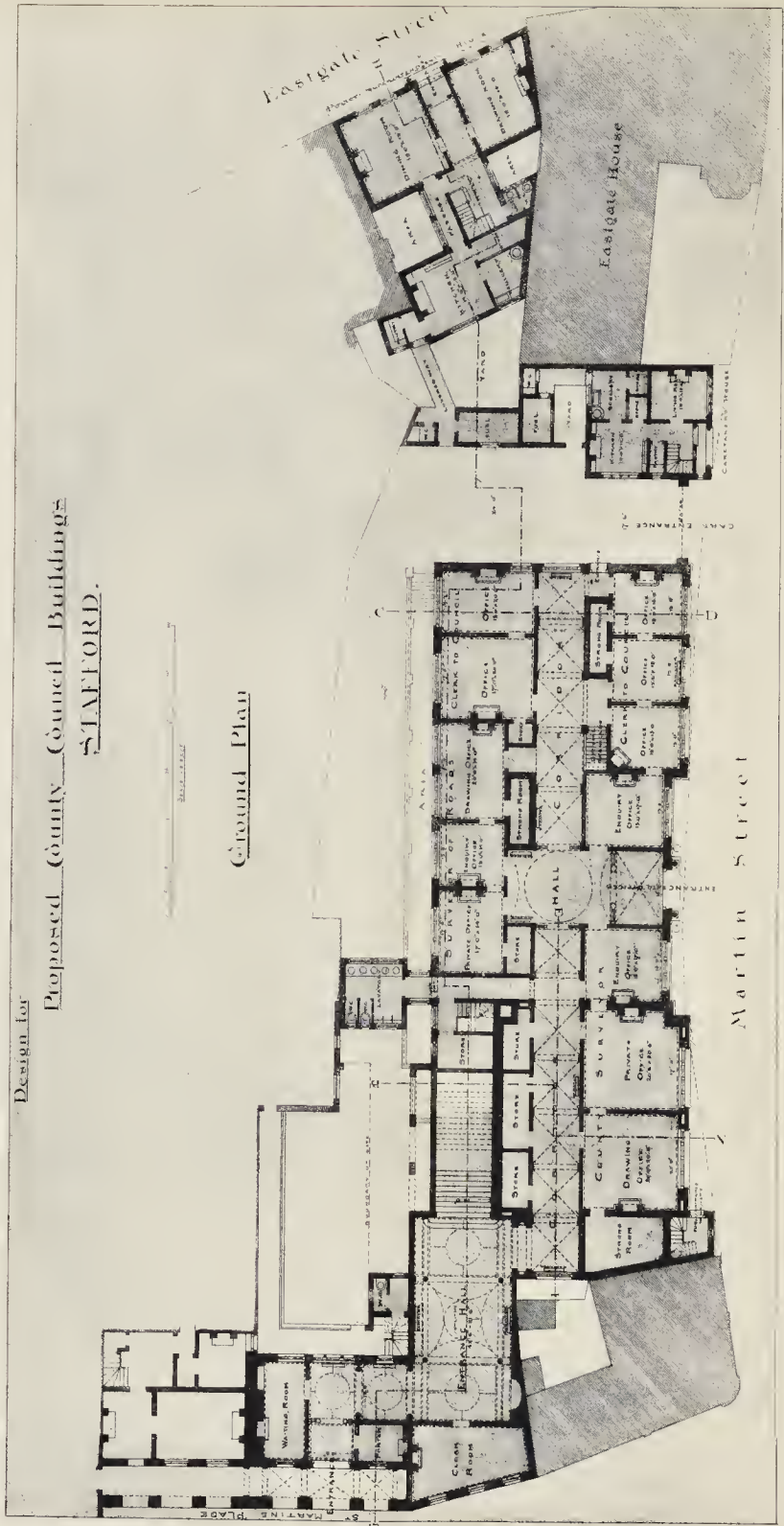
Handd. R. Dakin. mens et delt.



THE BUILDER, AUGUST 6, 1892.

Design for
Proposed County Council Buildings
STAFFORD.

Ground Plan

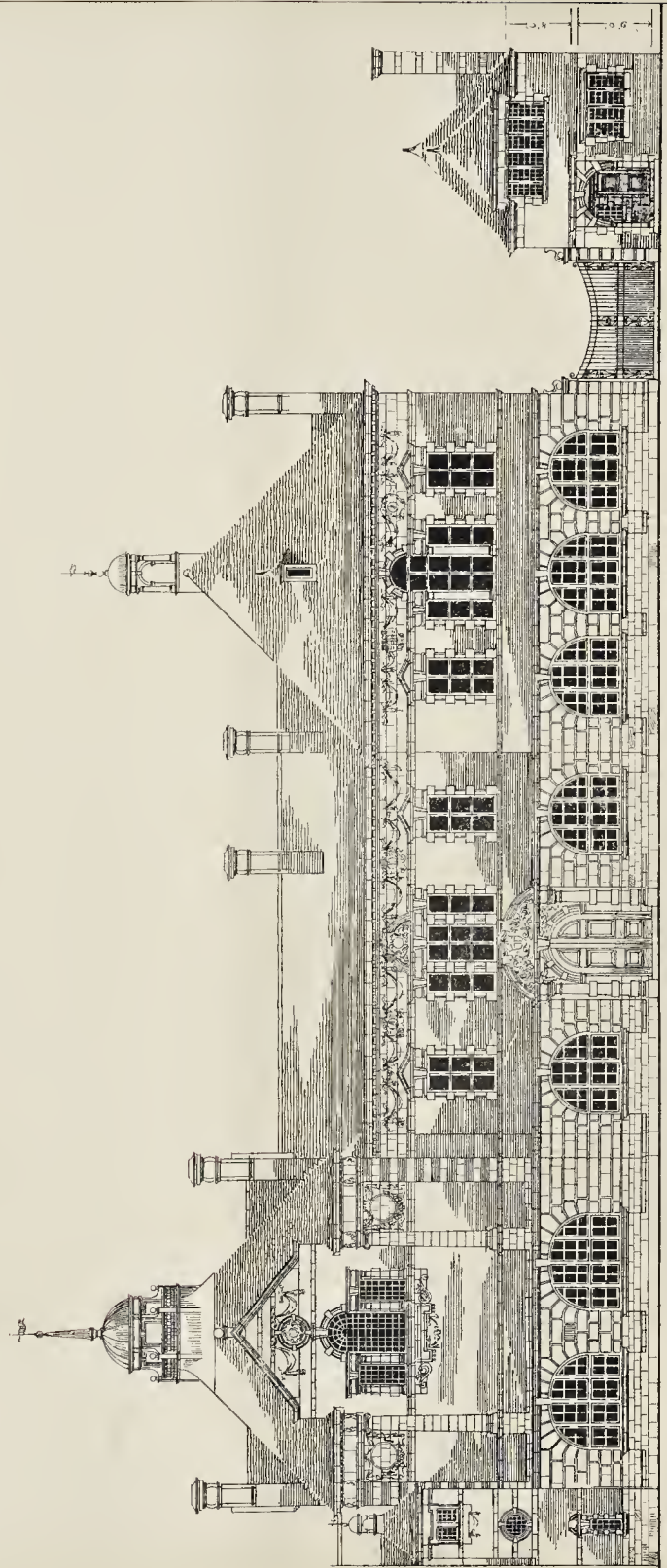


INK PHOTO. SIMMONS & CO. 4 & 5 EAST HARDING STREET, LONDON, E.C.

SELECTED DESIGN FOR STAFFORD COUNTY COUNCIL BUILDINGS.—MR. H. T. HARE, A.R.I.B.A., ARCHITECT
GROUND PLAN.



THE BUILDER, AUGUST 6, 1892.



Elevation to Martin Street.

SCALE OF FEET

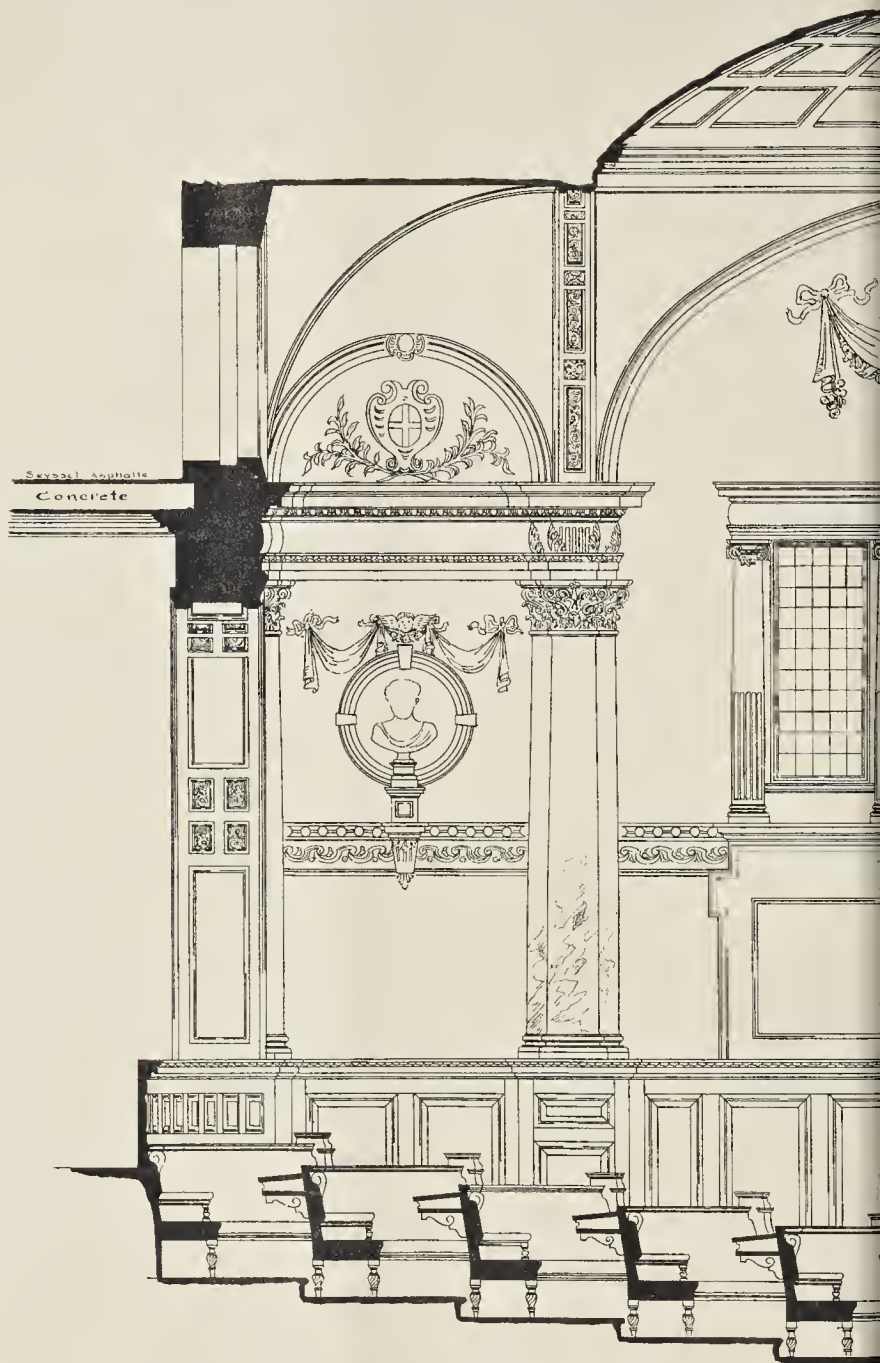
SELECTED DESIGN FOR STAFFORD COUNTY COUNCIL BUILDINGS. MESSRS. H. T. H. & CO. ARCHITECTS, 1, BROADWAY, LONDON, E.C. 4. DRAWN BY H. T. H. & CO. ARCHITECTS, 1, BROADWAY, LONDON, E.C. 4.



INK PHOTO SPRAGUE & CO. 48-5 EAST HARDING STREET, NEW YORK, N.Y.

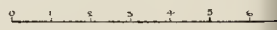
SELECTED DESIGN FOR STAFFORD COUNTY COUNCIL BUILDINGS.—MR. H. T. HARE, A.R.I.B.A. ARCHITECT.
PERSPECTIVE SKETCH (NOT SUBMITTED IN COMPETITION).





Sevssel Asphalte
Concrete

Half elevation of Side



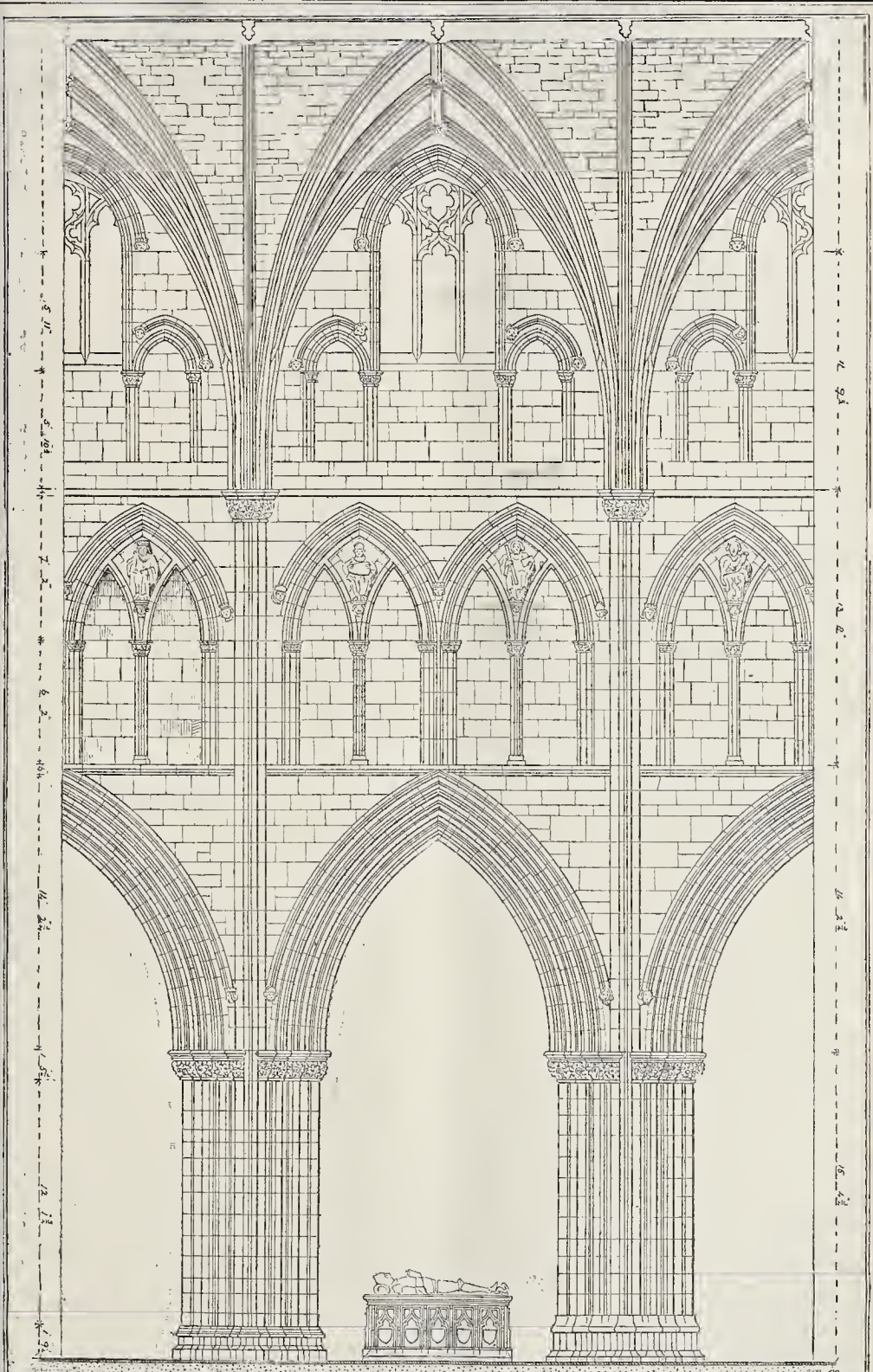


Half elevation of End

of Feet: 10 11 12 13 14 15 16 17 18 19 20

PHOTO. ITHO SPRAGUE & CO. 44 S. EAST HARDING STREET, FETTER, LANE, E.C.

BUILDINGS.—MR. H. T. HARE, A.R.I.B.A., ARCHITECT.
CHAMBER



Worcester Cathedral: Interior Elevation of Bay, North Side of Nave. Measured and Drawn by Mr. Harold Brakspear.

flanked on each side by a narrow steeply-pointed opening. The shafts of the ground story and vaulting piers are delicate, and clustered, with square and splayed abacuses. The vaulting shafts of the easternmost of two bays rest upon the earlier Norman banded pier, before referred to at the level of the triforium. The nave vault over these Transitional bays is of later date, but the vault of the south aisle is of contemporary work, also that to the south-west entrance passage to the cloisters which adjoins. Three western doorways existed in the end wall; all were hocked up until recently, when the great west window was erected, and with it a modern Norman portal made for the nave, the arches for the doors to the aisles are traceable in the wall. Otherwise no Norman or Transitional features remain to be recognised in the west front, except the angle turret buttresses and the restored round-headed windows above the aisles in the triforium, with later tracery insertions. A beautifully-elaborated pointed Norman doorway exists unrestored to the south-east entrance passage to the cloisters, of a different type to the other Norman work, and its isolated position at the end of the earlier passage suggests that it was the work of a different time. In the south wall of the great transept there are fine late Norman windows, with round arches with a bold zig-zag enrichment; these are now obscured by the great organ. The restoring purists removed a Perpendicular window from the upper story of this wall to place in the Norman wall an Early English triplet, while in the opposite north transept they replaced the eighteenth-century Perpendicular window with a geometrical tracered one, a concession, doubtless, to the variety of dates in the removed windows.

The original Early English work of the choir and presbytery is exceedingly fine; it was begun in 1224, at about the most vigorous period of the style as a native growth, and the design of the Lady Chapel and choir can compare boldly with Lincoln or with Salisbury, which was erected at the same date, and not to any disadvantage. The carving is rich and pure, and much fine figure sculpture was used, some of which remains in the spandrels and tympanums of the triforium and wall arcades. The proportion of the extended choir, eastern transepts, and Lady Chapel externally produce the same happy effect as at Lincoln, the lantern tower standing nearly midway between east and west. The internal proportions, though, of course, on a much smaller scale, are not dissimilar; the height of the choir, raised as it is upon the Norman crypt, and continuing the ridge line of the nave, being reduced to the moderate height and full width of the Lincoln choir; but eastwards Worcester has the advantage, for, as soon as the limit of Wolfstan's apsidal crypt is passed, the Lady Chapel resumes the lower level of the nave floor, and the additional height being thrown into the ground-story piers, an effect of loftiness is obtained which is very dignified. This increased effect of height was evidently sought for in the design, as the eastern transepts, though of the same approximate height as the great transepts, are considerably narrower. The width of the bays in the Lady Chapel eastern transepts and sacristy are also less than those of the choir, thus aiding in apparently increasing the height eastwards.

But before the beautiful and extensive work of the Early English epoch was undertaken, the usual fires, falls of towers, and wonders worked at tombs, had occurred. Eight years after Wolfstan's death Worcester was destroyed by fire with the church and castle, and the preservation of the bishop's tomb from the falling embers and lead of the roofs, shows that his contemplated choir and apse had been erected and roofed in over the crypt. The Transitional work towards the end of the twelfth century which replaced Wolfstan's was itself destroyed by fire in 1202, of this, however, the western bays of the nave remain, and the then new tower is recorded to have fallen previously in 1175. We also read of the fall of two towers besides, in a storm, and, as there were no western towers, it is conjectured that smaller towers or turrets adjoining the transepts must be referred to. In the midst of these disasters wonders began to take place at the tomb of Wolfstan in 1201, upon St. Valentine's Day, and continued increasing to a considerable extent during the ensuing year, so that a commission appointed by the Pope visited Worcester on St. Giles's Day, and inquired into them and reported. The result was that St. Wolfstan was canonised in May,

1203, and the flow of offerings continued to an extent which justified the rebuilding of the eastern end of the Cathedral in 1224 by Bishop William, of Blois. The Cathedral had meanwhile been repaired and re-dedicated after the fire, and the works had evidently extended over some years. King John, who had visited the tomb of St. Wolfstan in 1207 in State, contributed to the cost of the reinstatement of the cloister after the fire of five years previously, he had died in 1216, and his body was brought from Newark and interred in the choir between St. Oswald and St. Wolfstan. A fine sixteenth-century decorated effigy and tomb now mark his resting-place, and one fears that the favour he showed to Worcester and its Saint, rather than even blind respect for his office, have preserved in the very centre of the choir of a Christian church the effigy of the worst king politically and morally that England has had. It is indeed a wonder that Cromwell's soldiers, who mutilated every saintly image in the building, spared his nose and face, perhaps he was left in cynical respect for the memory of the departed monarchy.

The repaired Cathedral was dedicated in 1218, in honour of St. Mary, St. Peter, St. Oswald, and St. Wolfstan, on June 7, in the presence of Henry III. and many distinguished persons, when the remains of St. Wolfstan were placed in a magnificent shrine. The miracles continued after the interment of King John, and, with the undoubted sympathy of his son, the re-erection of the choir and the eastward extension was commenced. The heat used was made by the monks and bishop of the tide of gifts and profits from the miracles while it lasted, as it soon after began to flow down the Severn to Gloucester, to the shrine of Edward II. It is recorded that Bishop William of Blois began the new work of "the front." Professor Willis remarks that in Medieval documents the front of the church is usually the east end. This would be, therefore, the wall of the Lady Chapel, and involved the demolition of the superstructure of the Norman crypt recently re-dedicated, and extending up to the tower. The new choir, with its vault, was loftier than its predecessor, and the bays were wider than those of the Normans, rising with their pointed arches higher still in proportion. The triforium was, however, lower than the corresponding Norman story, but the clearstory was similar in height. A secondary arcade at the back of the triforium, against the wall which encloses the space over the aisles, gives much the same effect of interlacing arches as in St. Hugh's much-discussed arcades at Lincoln. The shafts clustering around the piers are of Purbeck marble, bow of that peculiar colour produced by ill-directed attempts at polishing. They are jointed with metal bands, and as it is stated in Leland's Itinerary that Bishop Giffart decorated the columns of the east portion with small marble columns having joints of gilt brass, considerable discussion has arisen not only as to the chronology of the work,—the bishop reigning from 1259 to 1302, the building being commenced in 1224,—but as to the rings and their use. It does not seem to have occurred to Professor Willis even that the marble shafts are bedded with lead seatings, and that this narrow seam of lead was decorated by the rounded brass ring with which we are familiar at Westminster. The presence of an iron cramp connecting the shaft with the pier has been rightly understood as provided for the purpose of attaching the shaft after the settlement of the pier; but this has nothing to do with the brass ring and lead bedding, the existence of which can be tested by scratching the surfaces. Many instances will occur to the mind of these Purbeck grouped shafts which have been crushed, bent, and split vertically owing to the settlement of the central pier, but the plan adopted at Worcester has avoided such results.

Bishop William, who initiated the works, and probably saw them partly vaulted, if not entirely, before his death in 1236, lies buried in the middle of his work, before the altar of the Lady Chapel. His effigy is a singularly complete and beautiful work of the thirteenth century, showing the full vestments, which were formerly ornamented with jewelled settings.

The rebuilding of the nave was not undertaken until the next century, it being commenced by Bishop Cobham, who occupied the see from 1317 to 1327. The condition of the Cathedral at this time appears to have been that the magnificent choir and Lady chapel had been

completed, by means of the pilgrims' offerings, much as we see them now, that the twelfth century tower, however, which fell down in 1175, had not been rebuilt, the adjoining transepts had been damaged by it and now evidence Transitional and Norman work in their lower stories only, the upper portions being of Perpendicular date, without connecting links to the earlier period, and the nave of Norman and Transitional work. We find that so late in the thirteenth century as 1281, Bishop Nicholas, of Ely, formerly of Worcester, bequeaths a legacy for the rebuilding of the tower, but as no work of that date remains, it is probable that the expenditure was deferred until Bishop Cobham undertook the reconstruction of the north side and aisle of the nave completely. He lived to complete the clearstory and to vault the side aisle throughout, the main vault, however, stopping at the two westernmost bays, which he left, of the Transitional nave. This early fourteenth-century work is a good example of the Decorated style. The shafts and mouldings, though not so bold as in the earlier work of the choir, are full and rich, not suffering from the over refinement of the later work. The plan of the earlier nave was adopted, the heights of the ground and triforium stories being altered, but the total height to the springing of the vault remaining the same; springing-stones were built in for the vault, which was not added for some considerable time; a rectangular chapel was built in the second bay of the aisle from the transept, and vaulted with the north aisle. Professor Willis gives a summary of the fourteenth century works obtained from the notes of Dr. Hopkins, a prebendary of the Cathedral from 1675 to 1700, which he found in the Baker MSS. in the Harleian Collection, as follows:—

1320. Prior Braunston built the gester hall. 1372. Refectory and cloyster built. 1374. Tower or belfry. 1376. Stone vault over the choir under the belfry and over St. Thomas' altar. This is explained by the fact that the choir at that time was placed under the belfry. 1377. The vault over the nave of the church, the library, treasury, and dormitory. 1378. The water gate. 1379. The infirmary and stalls in the quire. 1380. The west window. 1380. The north porch of the church.

The north wall of the nave being rebuilt in the early part of the fourteenth century, and the south wall and vault not being undertaken till fifty years after, the condition of the church with one side Norman, the end Transitional, and the other side of new Decorated construction, can be imagined with difficulty, as a temporary roof only could have been used. The slackening of the tide of pilgrims and their gifts probably hastened the completion of the nave, as the late fourteenth century south wall and aisle, of Early Perpendicular detail, do not display the care and skill or beauty of the Northern wall, which it closely follows in general design. The mouldings are attenuated, and the shafts over-thinned, and scarp little carved capitals take the place of the rich bands of foliage which make the Decorated capitals. The vault, perhaps with the exception of the two western bays, which were the work of Bishop Wakefield 1375-94, was built by Abbot Horton, who died in 1377, and is ingenious and beautiful. The unity of design secured at Worcester is unusual in Medieval work, the Transitional, Decorated, and Perpendicular portions all come together as harmonious parts, well connected into a whole by the vault; there is no definite breach of intention or contemptuous ignoring of earlier work so often seen elsewhere. As much of each period is retained as possible, probably not only out of respect for the work of the patron saint, but also, in the later portion, from motives of economy. It also appears that the works were never wholly given up to the unrestrained will of one individual; the existence of the large monastery acted as a balance to the power of the bishop, as we find agreements between bishop and convent respectively for the execution of fixed portions of the work in the cases of Bishops William of Blois and Cobham. Simultaneously with the work in the nave the reconstruction of the tower was undertaken; the Norman piers remained as a core, and were eased with the fourteenth-century shafts and mouldings; the springing of the arches was raised to the new level of the nave vault in 1374, the vaulting under the belfry completing the work in 1376. Bishop Wakefield's work remains in the north porch and the inner arch of the great west window, filled in a few years ago with geomet-

rical tracery inconsistent in style with everything in the Cathedral, and he was hurried under the two bays of his vault at the west end.

Of later Perpendicular work there remains the very fine chantry of Prince Arthur, son of Henry VII., on the south side of the choir, an interesting example of the early development of the traceried vaulting that so rapidly attained the beauty exemplified in his father's later chapel at Westminster. Perpendicular tracery was freely inserted in the earlier windows. The principal internal work, however, was the vaulting and decoration of the great transepts. The walls above the ground stories, which are of Norman, were panelled with an early cusped treatment, with millions and transoms that form strings and vaulting ribs, and are an early attempt at a complete paneling of the wall surface, which later became prevalent, as at Canterbury and Gloucester.

The cloisters, now completely restored, are of this period. The vaulting is boldly moulded with finely-carved bosses. It springs from the south wall of the nave, without any relation to the buttresses which mark the internal vaulting bays. The piers on the inner walls around three sides of the garth have square openings in them, somewhat of the character of a continuous hagioscope. The chapter-house had windows inserted and a new face given to it at this time. A most interesting series of apartments between the chapter-house and the south transept also belong to this period; they are the treasurer's chambers, and have a communicating passage to the south-east chapel of the choir. They are roofed with a flat four-centred vault, and have a vaulted gallery leading to other smaller chambers, perhaps used as dungeons. Upon the opposite side of the church, in the north choir aisle, is a picturesque oriel window of similar date, projecting from the outer wall as a watching-loft. This must have been reached from the chamber over the north-east chapel now destroyed, and was used by the sacrist or watching friars. There are also evidences that the large room over the north porch was used as a dwelling in connection with the Cathedral. The triforium gallery over the south aisle is now used as the Cathedral library, the hooks being recently removed there again from the chapter-house. It is lighted by Perpendicular windows above the south aisle.

A finely-moulded stone Perpendicular screen, a fragment of which has been preserved, is fixed in the arch opening to the choir from the south transept. The pulpit in the choir was erected there in 1748, but is of Perpendicular date, and was formerly in the nave.

Reformation times and Worcester will always be connected with the great Bishop Latimer, the most vigorous reformer and eloquent preacher of his time. In his day there was a "fair stone cross in the churchyard, which was the usual preaching place, as at St. Paul's, London. There were also seats for the chief of the city on the north side of the church, but south from the cross, much resembling those of St. Paul's." There is no memorial of Latimer in the Cathedral, or indeed anything but the name of the place and see to remind us of him; but his fame will not suffer by this neglect.

The choir seats and stalls of 1879 were removed from under the tower to the presbytery, their present position, about 1537, on the establishment of a Dean and Chapter, and Renaissance canopies placed over them at a latter period. These remained when Professor Willis wrote in 1862 that they "are valuable specimens of woodwork," they were however removed at the "Restoration" of the choir, and nothing put in their place. The Cathedral suffered much damage after the battle of Worcester at the hands of Cromwell's soldiers, and substantial repairs were made in 1712, partly at the cost of the Government, to replace the damage. At this time a buttressing wall was erected across the north-east transept to prevent the piers of the choir from falling, and the wall was pierced with four quatrefoils of hold design.

The great north transept wall was rebuilt in 1748, with a Perpendicular window of the period and turrets, by a local architect, Mr. Wilkinson, who erected St. Andrew's, Worcester, and displayed a tendency to the most attenuated form of spire and pinnacles. Successive alterations were made to the east and west windows. In 1812 a new altar screen was erected, and finally, in 1857, extensive restorations were undertaken, under the late

Mr. Perkins of Worcester, and Sir Gilbert Scott was called in to design the "Restoration" of the choir. Of all this work, and the elaborate rereds, it is exceedingly difficult to speak even descriptively. One has a lingering fear that the enthusiasm with which it was regarded twenty years ago has already changed to dislike, and fearing lest this feeling should also prove ephemeral, it may be better to leave the modern work at work at Worcester to the tender mercies of the next generation, who may safely regard it as the *no plus ultra* of Liberal "Conservative Restoration."

STAFFORDSHIRE COUNTY COUNCIL BUILDINGS.

We give the principal elevation and plans of the design, by Mr. H. T. Hare, which has been selected in competition for the new County Council buildings at Stafford; also the drawing showing the detail of the Council-room, and a perspective sketch of a portion of the intended building, executed after the competition designs were sent in. The whole of the designs submitted are still at Stafford, and will be exhibited in the Shire Hall there next week, when we shall have an opportunity of reviewing them generally. We have selected these drawings of the accepted design, after consultation with Mr. Hare, as those which best represent the treatment of the building. Owing to the presence of existing buildings on the site, one of which is partially worked into the new building, the other elevations are not architecturally important.

The following quotations from the architect's draft report, which he has placed in our hands, will give sufficient information as to the general scheme and treatment of the design:—

"The suggested arrangement of the departments has been adopted,—that is, the Council-hall and committee-rooms are on the first floor, and the offices on the ground floor beneath them. The principal difficulty which presents itself in the consideration of the plan is that, owing to the main entrance being at the end of the long narrow site, it is apparently a necessity that there should be a long corridor for access to the rooms on the first floor. This difficulty the author has endeavoured to obviate by the arrangement of the entrance-hall and staircase on an axis at right angles with St. Martin's place. The effect of this is that the head of the staircase leads immediately into a central ante-room, with which the Council-hall and committee-rooms communicate, only a very short length of corridor being required, and this is treated in such a manner as to become practically a part of the ante-room.

The main entrance has been kept as far as possible towards the market square, the loggia to the Judge's house being continued to form a recessed porch. The treatment of this portion of the front being restricted to the ground-floor story, the author is of opinion that any attempt to deal with it more elaborately than the existing arcade would be detrimental to the effect of the whole. The alterations suggested to the ground floor involve no serious structural operations, and the accommodation provided comprises waiting-room, cloak-room, and porter's lodge.

The entrance-hall is 40 ft. 6 in. by 21 ft. 6 in., and 12 ft. 6 in. high, this latter dimension being fixed by the height of the existing story. An increased effect of height is, however, obtained by the introduction of a central dome, which is behind the existing buildings, and from which the hall is lighted.

The ante-room on the first floor is top-lighted, and is designed with a grained ceiling in plaster, which would afford a field for an effective scheme of colour decoration.

The Council-hall is entered from the ante-room by two doorways. The general form of the apartment is a square, of which the side is 39 ft. The seating is arranged in tiers to a circular sweep, the centre from which the circle is struck being the chairman's seat. The two gangways are kept as far as possible to the sides, so that the division of the Council into parties or sides would be a practical impossibility. The author is of opinion that the acoustic properties of the hall would be eminently satisfactory, and no other arrangement of seating would give the requisite amount of accommodation at so small a loss of space. The hall is amply lighted from windows placed high up, which would give a more pleasing effect than any form of roof lighting.

The entrance to the offices is from Martin-street, and leads into an entrance hall from which the corridor runs right and left. The departments are so placed that the inquiry office of each is entered from the hall. By this arrangement the public would not require to use the corridors, which are screened from the hall, and would thus become practically private to the officials.

The author has made a personal examination of the site and existing buildings, and finds that it is not possible to make a connexion between the new and the existing buildings on the ground floor without seriously interfering with the Judge's house, and even if this were done, it is very questionable whether the communication would be of any practical value. The loggia at the entrance will, however, form a connexion under cover. The suggested communication on the first floor is obtained at the only available point, by a corridor running from the main staircase. A w.c. and lavatory are provided to take the place of those removed.

Provision is made in the basement for heating apparatus and electric lighting plant.

Materials and Construction.

The front elevation is proposed to be faced with stone up to the level of the first floor, similar to that used in the existing buildings. The upper portion of the front to be faced with best red facing bricks, with stone dressings, strings, &c. The back elevations to be entirely in brick.

The whole of the floors to be of fireproof construction in steel and cement concrete. The flat roof to be constructed in a similar manner, and covered with Seyssel asphalt 1 in. thick laid to falls.

The roofs of main buildings to have wrought iron principals, with timber purlins, boarding and felt, and covered with 14 in. by 18 in. Whitland Abbey slates, fastened with copper nails to 3 in. lap.

The turrets to be covered with copper. The floors of the main entrance, entrance-hall, ante-room, and ground-floor corridor, to be paved with black and white marble tiles in 12 in. squares. The floors in offices to be of 1½ in. keyed pitch-pine blocks. The floors in Council-hall, committee-rooms, &c., to be of 1½ in. teak blocks, wax polished.

The main staircase to be in Hopton Wood stone, and the official and public staircases in rubbed York stone.

The walls in entrance hall to have a panelled teak dado, and above to be lined with polished Hopton Wood stone. The walls of the main staircase to be lined with Hopton Wood stone up to the height of the string-course, and above finished in plaster for colour decoration. This treatment would be continued in the ante-room, corridor, &c.

The walls in the Council-hall and committee-rooms to have teak panelled dados, and to be finished above in plaster.

The pilasters and columns in Council-hall and entrance to be in polished Devonshire marble. The whole of the doors and other joinery on the first floor to be in teak, and the seats and other fittings in the Council-hall in the same material, upholstered in dark green leather.

The walls in the offices, &c., to be finished in plaster and painted in oils.

The windows to be glazed with polished plate-glass throughout, except in the Council-hall and main staircase, where it is suggested that lead glazing be introduced, and possibly replaced at some future time by painted glass. The glazing of the upper panels of the doors to offices to be in double muffled glass.

The ceilings to Council-hall, committee-rooms, &c., to be executed in fibrous plaster, enriched as suggested on the drawings.

Heating and Ventilation.

The offices, committee-rooms, &c., are provided with open fireplaces.

The heating of the other portions of the building is proposed to be effected by low-pressure steam, with radiators in entrance-halls, corridors, &c. In the case of the Council-hall a powerful steam coil is placed in the basement, and fresh air is drawn from the outside, filtered, and passed over the coil, by a 4 ft. cased fan, driven by a gas engine. After being heated it is conducted to convenient points of outlet by flues. The apparatus would also be available for cooling the room in hot weather.

Inlet ventilation would be provided for in all the offices, committee-rooms, &c., by Tobin's tubes.

Extractors are placed in the roofs over the Council-hall and committee-rooms, and the current would also be assisted by small steam coils placed in the shafts. Each office would be provided with a special extract-flue running up beside the smoke-flue.

Architectural Treatment.

This is somewhat restricted by the existing buildings and the fact that the main frontage is in an unimportant thoroughfare. The style the author has adopted is the English Renaissance of the seventeenth century, which is in harmony with the existing buildings.

The elevation to Martin-street is of simple character, but the author has endeavoured to impart to it some dignity and expression. The upper portion is faced with brick with stone dressings, as the street scarcely seems to warrant an entirely stone-faced building. This, however, is not essential part of the design, and if considered desirable, stone could be used throughout without affecting it in any other way.

The elevation towards Eastgate-street is treated

somewhat in a similar manner to the adjoining Eastgate House."

The cost of the building is estimated by the author as 17,477*l*.

COMPETITIONS.

PROPOSED EXTENSION OF THE MANCHESTER ROYAL INFIRMARY.—A special general meeting of the Trustees of the Manchester Royal Infirmary was held on the 27th ult., in the Memorial Hall, Albert-square, Manchester, to consider the proposal of the Board of Management to extend the Infirmary buildings on the site in Piccadilly. The report of the sub-committee of the Board of Management, nominated on February 17, to consider plans for an extension of the Infirmary consistent with its possible future construction was taken as read. The sub-committee stated that five meetings were held, at which three sets of plans submitted for competition received careful scrutiny, with the view to determine their several merits, their relative adaptability for furthering the best interests of the institution, their general features in respect of harmonising with existing surroundings, and in their entirety as tending to form an additional ornament to the city. The prescribed requirements had been complied with by each competing architect.

Different methods, however, having been followed in working out details, the committee had had to give careful consideration to each plan with regard to its suitability to the use intended. Two of the three competing architects had selected the Piccadilly frontage as the one best adapted for carrying out an extension. In this conclusion the sub-committee fully concurred. The sub-committee had further determined that, if the requisite extension could be effected by a three-storied elevation, such would be preferable to the addition of a fourth story. They were of opinion that each new ward should be built on the "pavilion" principle, and that any scheme calculated to provide four rows of beds in a ward, divided by an intervening screen, would be open to sanitary and other objections which do not apply to wards constructed on the recognised method of placing two rows of beds opposite one another against the outer walls.

The sub-committee had carefully weighed the respective advantages of adopting circular wards as against longitudinal wards, and, without attempting to dogmatise on a question that has enlisted advocates and architects on either side, they had concluded that,—allowing each system to have compensating merits,—the construction of circular wards would be so much out of harmony with the present building as to make their adoption an incongruity. The sub-committee recommend the plans,—subject to minor changes in detail,—of Mr. Alexander Graham, which, in their judgment, offered the lowest countervailing drawbacks; and they were satisfied that if their carefully considered opinions and suggestions were adopted, Manchester would find itself possessed of an infirmary second to none in outward architectural effect and in internal efficiency. In the matter of cost, Mr. Graham submitted the following estimates:—(1) Two new wings, new operating theatre, and sundry structural and other alterations of the main building, as shown on the several amended plans, 34,000*l*.; (2) extension of the nurses' home, as shown on the plans of December, 1891, including sanitary fittings, 5,020*l*.; (3) extension of out-patients' department, and alterations thereto, 1,700*l*.; total, 40,720*l*. If the suggestions of the Committee were carried out, the increased area built upon would represent less than one-third of an acre, and the whole space then covered will be less than 1½ acre, leaving about 3½ acres still uncovered.—The Chairman, Mr. E. S. Hayward, submitted the following resolution:—"To receive and consider, and, if approved, to adopt the report of the Board of Management upon the architect's plan for the proposed extension of the Infirmary on its present site."—Dr. Renaud seconded.—Sir W. H. Houldsworth, M.P., moved as an amendment, "That the trustees are of opinion that whilst it is manifestly important that the Infirmary should be retained on its present site in the utmost state of efficiency, any extension of the accommodation thereon is very undesirable."—Dr. Leech seconded.—The amendment on being put to the meeting was carried.—Mr. Platt Higgins, on behalf of the Board of Management, thereupon demanded a poll, which will be taken next week.

PROPOSED TOWN HALL, WALSALL.—We are informed by the Town Clerk that the Committee, after careful consideration of the thirty-nine designs sent in in the preliminary competition, have awarded the two premiums as follows: 1st, to Mr. John R. Withers, Shrewsbury; 2nd, to Mr. Daniel Arkell, Birmingham. It is added that as from the designs sent in it is clear that a hall sufficient to meet the requirements of the town can be erected on the suggested site, it is the intention of the Committee to recommend the Council to offer in competition three premiums of 100, 75, and 50 guineas respectively for complete designs, including specification and estimate of cost. If this recommendation is adopted, notice of the competition will be given in due course. Finally, the Town Clerk says that in coming to a decision on any new designs which may be submitted, the Committee will not be fettered in any way by those which have been awarded the premiums in the preliminary competition, which was for the purpose of ascertaining the maximum accommodation which could be obtained on the site.

Books.

Notes on the Construction of Cranes and Lifting Machinery. By EDWARD C. R. MARKS, M.I.M.E. London: John Heywood, 1892.

THESE notes were originally written in the form of a series of articles for the *Practical Engineer*, and have appeared in that journal at different times during the last two years. The information given is of a practical nature, and such as is often required by engineers and purchasers who wish to have descriptions and particulars regarding the general principles and capabilities of lifting machinery.

Longman's School Mensuration. By ALFRED J. PEARCE, B.A. London: Longmans, Green, & Co. 1892.

In this little book the author explains, in a clear and concise manner, the principles upon which mensuration is founded, and gives in nearly all cases a simple proof of the rules, which can be easily mastered by all students who have but a slight knowledge of mathematics. Besides containing a large number of well-chosen questions at the end of each chapter, several examination papers have been introduced, and the book throughout is well furnished with such diagrams as are necessary to illustrate the various examples given in the text.

Pumps and Pumping. By M. POWIS BALE, M.I.M.E., A.M. Inst. C.E. London: Crosby Lockwood & Son, 1892.

MUCH useful information of a practical nature will be found in this little book on pumps. Nearly all kinds of pumping machinery have been noticed, and more or less described, and what the author has to say on each subject has been conveniently arranged, under the form of headed paragraphs, so that the work is well suited for reference, especially in cases of emergency. A careful study of the book will well repay those who have to use and work pumps; and, although the matter has had to be considerably condensed, yet it is always given in a way that can be readily understood.

SANITARY STATE OF NANTES.—According to a recent report of the British Consul at Nantes, although several new streets have been opened in various quarters, to the improvement in the appearance of the city and the health of its inhabitants, the sanitary condition of the town is deplorable, the drainage being indifferently done, and the emanations from gratings in front of badly drained houses lay the germs of all kinds of diseases. An alteration in the existing system of drainage would entail an enormous expenditure, but it is to be feared that no change will take place until the townsmen are sufficiently enlightened to realise the benefit thereof. The quality of the water supplied to the town is so polluted that it is quite unfit for drinking until boiled and carefully filtered. The water is drawn at a point between two sewers, which pour into the river of the town, and the soiled linen is washed in the same stream. The new system of filtration through sand, recommended after a series of experiments by M. Lefort, the Chief Engineer of this town (see the *Builder* for November 15, 1890, page 335), has been approved by the Municipality, and estimates of its cost ordered, but to carry out the plans it will be necessary to compensate the water company.

Correspondence.

To the Editor of THE BUILDER.

THE R.I.B.A. EXAMINATION.

SIR,—I have evidently not expressed myself clearly enough to avoid misinterpretation. My proposition is: that while the Examination is a sufficient and the only possible test of a proper education in architecture, it is no more a test of the capacity of a man as an architect than are the cognate examinations in Law and Physics of the skill of the graduates in the practice of either profession.

This seems a self-evident proposition, and I only restated it, because it appeared to me that in exercise of the right he claimed of "putting his own construction" on the expressed opinions of others, Mr. Pite and, presumably, some of his friends, were imputing to the body of the Royal Institute of British Architects the ridiculous pretention that the Examination was a test of a man's capacity as an architect.

The question I asked, and ask again, was whether, as seemed to be suggested, Mr. Pite wished to institute a more stringent examination in the art side of architecture.

At one moment it appears that what are called "the Memorialisists" are against any examination in art, but at another it seems as if they wished to have a stricter examination, coupled with prizes or diplomas for proficiency.

Unless they define their position in this respect, they cannot expect that the body of the Royal Institute of British Architects will pay much attention to what appear to be efforts to obstruct the course of the Institute.

This is not an instance of particular obtuseness on my part, since I have not been able to find any one, even among themselves, who can clearly state what they want, although there appears to be a vague desire to do something for art.

If they say that all examinations in art are illusory, I and others are heartily with them, and we have only to point out that the examination deals only with the history and knowledge of past art and the power of expressing ideas by drawings; both of these are necessary, and can be tested.

If, however, they hold, as seems to me implied by Mr. Pite's words, that there should be a more stringent test, I have to say, for myself, that I repudiate as most undesirable and impracticable the attempt to impose as a test of admission to the ranks of a professional society the views on art that may happen to be current with any particular body of examiners. There is not a single phase of our latter-day developments of style that would not have been "snubbed" in its inception by such a body.

It is quite another thing for the Royal Academy and the Institute to endeavour to stimulate talent for design by a judicious system of prizes. No one need compete for these unless he choose, and no harm is done to the professional man working on other lines.

I do not wish in any way to misinterpret Mr. Pite's meaning, but the conclusion of his letter seems to point to what has been elsewhere obscurely hinted, that he wishes to limit the use of the word "Architecture" to the artistic side of building. If this he indeed the case, I must object to any small body of men taking upon themselves to alter the meaning of language.

Since the days of Vitruvius certainly, and probably for long before that, the attributes of an architect have included the practical and the business part of the profession, and indeed, the artistic side is hardly talked about, since it is taken as a matter of course.

If this latter-day school wish for a distinctive name they must really invent a new one for themselves, and leave us the old name of architect. I aspire to be the architect or ruler of the building for the work that I do, and do not at all wish to sink to the position of surveyor's draughtsman, which is what the new departure must infallibly end in.

RALPH NEVILL, F.S.A.

NEW CHURCH, FENSILIFFE, NEAR BLACKBURN.—The new Church of St. Francis, which has for the last two or three years been in course of erection at Fensiliffe, near Blackburn, was on the 25th ult. opened by the Bishop of Manchester. The structure is built from the designs of Messrs. Aldridge & Deacon, of Liverpool.

The Students' Column.

CONCRETE.—VI.
NATURAL CEMENTS (CONTINUED).
II.—PLASTER OF PARIS.

PLASTER OF PARIS is ground from the clinker obtained by burning gypsum at a temperature of 120 to 130 degrees Centigrade, until nearly the whole of the moisture in the gypsum has been expelled. Gypsum, as we have already stated, is a hydrated sulphate of lime (Ca SO₄ + 2 H₂O); plaster of Paris contains less moisture and is expressed thus:—2 Ca SO₄ + H₂O. On the addition of water to the plaster the particles are converted into gypsum, which dissolve in the water. When this becomes super-saturated crystallisation takes place, and the gypsum is deposited in groups of fibre-like crystals. Plaster of Paris has long enjoyed a reputation as a good fire-resister, and for that reason it has been used in concrete, notably by Messrs. Dennett & Ingle, for fire-resisting floors and ceilings. It weighs about 64 lbs. per struck bushel, or one-third less than finely-ground Portland cement, and its strength likewise bears about the same ratio to that of the latter. Plaster of Paris cannot be used for concrete in foundations or in water, or for concrete walls or stucco exposed to the atmosphere, as it is soluble in water and gradually disintegrates. For floors and internal plastering, however, it can safely be used. It is often said that plaster of Paris resists the influence of fire more than any other cement, but we are of opinion that its fire-resisting properties have been much over-valued, and are inclined to think that it has no advantage in this respect over good Portland cement. A series of experiments have been carried out under the direction of Mr. J. J. Webster, M.I.C.E., which do not place plaster of Paris in a very favourable light. The results will be found in the "Proceedings of the Institution of Civil Engineers" (1890-1), vol. CV., part III. Briquettes, having a breaking area of 2 1/2 square inches, were made of various mixtures of plaster of Paris, with slag, fire-brick, and pumice-stone, and of Portland cement with the same and other aggregates. Ten briquettes of each kind were made, kept in air, and tested for tensile strength at the end of four or five weeks. Five of each were broken at the usual temperature of about 60 degrees Fahr. The other five were carefully heated on the top of a specially built-up fire of coal and coke until they were of a light-red heat, the average time of exposure to the heat being about five minutes; they were then removed, and whilst hot were quenched with water. A large number of the briquettes lost all cohesive power after being quenched, and it was with difficulty that they were removed intact; as they could not in this state withstand any tensile strain, they were allowed to dry for three days. They were then broken. A summary of the results is given in the following table, copied (with certain alterations) from Mr. Webster's paper:—

TABLE VIII.
Summary of Tests of Concrete Briquettes.

No.	Materials in Concrete Briquettes.	Proportions of Ingredients	Average Weight per cu. ft.	Breaking Weight per sq. in.			Average loss per cent. of original strength after Heating and Quenching.
				At Temp of 30 deg. Fahr.	After being Heated and Quenched.	After being Heated and Quenched.	
1	Portland cement	Neat	124.6	554.6	117.2	78.8	
2	" " and sand	1 to 1	120.9	448	93	79.2	
3	" " " "	1 " 3	111.2	109.8	18.7	81.4	
4	" " " "	1 " 5	109.7	74.6	15	79.8	
5	" " iron-furnace slag	1 " 4	163.08	108.1	23.66	78.6	
6	" " fire-brick	1 " 4	35.04	84.4	30.5	68.8	
7	" " pumice-stone	1 " 4	64.8	93.3	39.5	59.5	
8	" " coke-breeze	1 " 4	71.85	69.9	30.06	59.9	
9	Plaster of Paris and fire-brick ..	1 " 4	89.6	66.8	10.3	84.5	
10	" " pumice-stone	1 " 4	55.6	57.4	3.4	94.07	
11	" " furnace-slag	1 " 2	148	223.6	4.7	97.8	
12	" " fire-brick	1 " 2	106.9	167.5	15.7	90.6	

This table needs some comment. In the first place, there are evidently several clerical or printers' errors in the table as printed in the "Proceedings C.I.E.," for the average strengths of the briquettes given in the fifth and sixth columns do not tally in four cases with those

calculated by the author from the individual tests, which are separately given by Mr. Webster. The only two, however, in which considerable variation occurs, are tests 8 and 11, column 6, where Mr. Webster has 39.06 and 6.9 instead of 30.06 and 4.7. But in the last column errors appear to have been made in calculation, and some of these were so great as to give quite a wrong idea of the relative value of the different mixtures; the author has therefore re-calculated the loss per cent. in all cases. The following are the figures given by Mr. Webster, 60.8, 80.0, 81.4, 79.8, 69.3, 59.9, 57.1, 75.0, 94.7, 96.8, 90.0.

It ought also to be mentioned that out of the five briquettes of the several kinds, which were heated and quenched, one in No. 2 and one in No. 3 were "damaged before testing," three in No. 4 were "damaged before testing owing to their soft condition," one in No. 6 was "broken in adjusting in the machine," two in No. 9 were "too soft to be tested," and one in No. 10 and one in No. 11 were "damaged before testing." Of the briquettes tested in the ordinary way, two in No. 5, one in No. 6, one in No. 8, and one in No. 11 were "broken in adjusting in the machine," and another in No. 11 was "damaged before testing." Mr. Webster has based his calculations on the strength of the briquettes which were actually tested in the machine, and has ignored the absolute lack of strength in those briquettes which were too soft to be tested, and the apparent weakness of those which were damaged before testing. We are not told whether the damages to these last resulted from being heated and quenched, or from accident at the hands of the operator, but it certainly seems only fair that those briquettes which were too soft to be tested ought to be reckoned. If we do this, we find that the briquettes of Portland cement and sand (4 to 5) have an average strength after heating and quenching of only 6 lbs., and the loss of strength will, therefore, appear as 91.9 per cent., and this is certainly more in accordance with what we should expect for briquettes containing such a large proportion of sand. If we apply the same method to the briquettes of plaster of Paris and firebrick (1 to 4), of which two were too soft to be tested, we get an average strength in column 6 of 6.2 lbs., and a loss, after heating and quenching, of 90.4 per cent.

More valuable results would have been obtained if the plaster of Paris had been tested neat, and also with coke-breeze and with sand, in exactly the same manner as the Portland cement was tested, but the tests are sufficient to show that concrete of Portland cement is not only originally stronger than that of plaster of Paris, but that it also withstands the deteriorating influence of fire and water better. The only tests which are strictly comparable are Nos. 6 and 7 on the one side, and Nos. 9 and 10 on the other. These show that briquettes of Portland cement and firebrick (1 to 4) are originally 26 per cent. stronger than similar ones of plaster of Paris and firebrick, while after heating and quenching they are no less than 196 per cent. stronger, or, reckoning the two soft briquettes, 392 per cent. stronger.

in the series Nos. 6 and 7, is 61.6 per cent., while the plaster briquettes in Nos. 9 and 10 lost 89.2 or (more correctly, we think) 92.2 per cent. The test, of course, was very severe, and concrete can hardly ever, in actual construction, be heated to such a degree and quenched so quickly, but it leads us to believe that Portland cement resists fire better than does plaster of Paris.

Mr. Hamor Lockwood made several blocks of concrete, some with gypsum and broken retorts (1 to 3), and others with Portland cement and burnt shale (1 to 4). At the age of six weeks they were all "subjected to intense heat for 1 hour and 45 minutes, after which they were plunged into water for 8 minutes, and when taken out those made with gypsum were completely disintegrated; whilst it took considerable force, applied with a sledge-hammer, to break those formed with Portland cement." These tests would have been more valuable if the nature and proportion of the aggregate had been the same in each case, but they certainly point to the truth of our contention, that the fire-resisting properties of plaster of Paris and allied cements have been greatly over-estimated.

The average tensile strength of neat plaster of Paris briquettes, kept in air, was ascertained by Mr. Lockwood to be 355 lbs. per square inch, and of neat Portland cement briquettes 649 lbs. per square inch, all being made at the same time, and tested at the end of fourteen days. Some briquettes of plaster of Paris were immersed in water, but would not set there.

Robinson's cement is, like plaster of Paris, a sulphate of lime. It is calcined from alabaster quarried at Knothill, near Carlisle, and is used not only for plastering, but also for concrete. The same statements are made about its fire-resisting qualities as are made about plaster of Paris; but no results of tests are given by the manufacturers in proof of these statements, and until we receive such results we must conclude that the cement is no better than Portland cement in this respect, and perhaps no better than plaster of Paris.

The strength of a sample of the cement was tested by Mr. Henry Fajja in 1885, and excellent results were obtained, as shown by the following table:—

TABLE IX.
Tensile Strength of Robinson's Cement in lbs. per sq. in.

		At		
		3 days.	7 days.	23 days.
Cement.....	Neat	497	549	784
" " and sand	1 to 2	—	459	525
" " "	1 to 4	—	297	331

The figures are each the average of five tests, and show the cement to be equal in tensile strength to the best Portland cement.

The resistance to crushing of neat Robinson's cement was found by Mr. Fajja to be "3,761 lbs. per cubic inch" at the age of five weeks, the average of five tests being taken. The compressive strength is about 18 per cent. less than that of Portland cement tested in a similar manner by the same person but not at the same time.

It is said that the cement is slow-setting and easy to work; that it may be used for an hour and a half after being gauged without detriment to its ultimate strength, and that in setting it "neither expands nor shrinks." As we all know, plaster of Paris expands somewhat in setting.

ARTIFICIAL CEMENTS.

1. *Slag Cement*.—A somewhat curious instance of the utilisation of waste-products is found in the manufacture of cement from iron furnace slag. For a number of years experiments have been made to this end, but without much success, the chief difficulty being that of pulverising the slag to a sufficient degree of fineness. The hardness of the slag has played havoc with the grinding-machines.

Composition.—All slags are not adapted for conversion into cement, as some contain substances which would prove injurious in cement, or do not contain the necessary ingredients in suitable proportions. A suitable slag may contain about 36 per cent. of lime, 30 per cent. of silica, and 23 per cent. of alumina. If to this slag 30 per cent. of slaked fat lime were added, we should have a mixture containing 46.5 per cent. of lime, 25 per cent. of silica, 19 per cent. of alumina, and 9.5 per cent. of iron and other

stances. This is actually the approximate composition of one slag cement, and differs from the composition of Portland cement in one or two particulars, notably in having from 11 to 14 per cent. less lime and about double the quantity of alumina. In some slag cements the proportion of lime is about 50 per cent. of the whole. Sometimes the slag contains an excessive amount of sulphur, and the cement made from it is of dangerous quality.

Manufacture.—Until recently, experimenters re-calculated the slag with the lime which had been added to it, but Messrs. Bosse & Walters a few years ago introduced a new process which seems to promise success. It was fully described by Mr. Gilbert R. Redgrave, A.I.C.E., in a paper which will be found in the "Proceedings of the Institution of Civil Engineers" (1890-91), vol. cv., part iii., and to this paper the author acknowledges his indebtedness for much of the information given in this chapter.

"The slag, on issuing from the furnace," says Mr. Redgrave, "is passed through a stream of water, by which means it is mechanically reduced to a spongy and readily-crushed material." After crushing, the slag-sand is dried and ground to a fine powder between ordinary millstones. To the ground slag is added the requisite quantity (about 25 or 30 per cent.) of pure lime, which has previously been thoroughly slaked, screened, and dried. The mixture is then introduced into a machine called a "homogenizer," where it is more intimately mixed and more finely ground in a revolving drum partly filled with small iron or steel balls. In about an hour the cement is withdrawn, and ought to be ready for use at once, for as the lime which is not in combination ought all to have been thoroughly slaked and screened air-slaking should not be necessary. The colour of the cement varies according to that of the slag from which it is made, but it is usually lighter than Portland cement, on account of the slaked lime which it contains.

Slag cement is usually slow-setting, requiring from two to five hours before it resists a moderate pressure of the thumb-nail. "When made up neat, it is more plastic and unctuous than Portland cement, and yields a richer and fatter mortar."

The theory of the induration of slag cement will be considered in the chapters on "Portland cement." The same kinds of tests ought to be applied to slag cement as to Portland, namely, fineness, tensile strength, specific gravity, and perhaps weight. The soundness test also may be applied, for it is possible for a slag cement to "blow."

Weight.—The weight may be as little as 85 lbs. per struck bushel, and seldom exceeds 95 lbs., or over 15 per cent. less than ordinary Portland cement. Probably the small weight of slag cement is due chiefly to its extreme fineness, as there are instances of Portland cement as ordinarily ground, weighing 115 lbs. per bushel, while the same cement, ground extremely fine, weighed only 90 lbs. per bushel.

Fineness.—On the importance of fine-grinding we shall not dilate here. Suffice it to say that fineness, especially in slag-cement, is of extreme importance. Mr. Redgrave declares that slag-cement ought to leave no residue at all on a No. 75 sieve (5,625 meshes to the square inch), and not more than 15 to 20 per cent. on a No. 150 sieve (32,400 meshes to the square inch). Now and then Portland cement has been tested, which has shown a degree of fineness equal to the standard here demanded for slag cement, but, as a rule, 10 per cent. residue on a No. 50 sieve is considered a fair test for Portland cement. A sample of slag-cement tested at the Royal Testing establishment at Berlin, in December, 1886, left no residue at all on a sieve with 1,160 meshes to the square inch, only 1 per cent. on one with 3,870, 5 per cent. on one with 5,800, and 14 per cent. on one with 32,200 meshes, but this, it must be remembered, was a manufacturer's sample.

Tensile Strength.—Good slag-cement, tested neat, is as strong as neat Portland cement, but, according to Mr. Redgrave, it gives considerably better results than the latter when both are tested with three-parts of sand. The tensile strength of the cement, mentioned in the last paragraph, was ascertained at Berlin to be as follows:—

TABLE X.

Tensile Strength of Slag-Cement.

	At 7 days.		At 23 days.
	lbs. per sq. in.	sq. in.	
Slag-cement, neat.....	647	692	
" " and sand 1 to 3....	427	509	

Each result is the average of ten briquettes, which were kept in air for twenty-four hours after gauging, being covered with writing-paper to retain the moisture, and were then kept in water for the rest of the time. The strength of the sand briquettes is exceedingly great, and is equal to that of some Portland cements tested neat; the German standard for Portland cement requires a tensile strength of 2,276 lbs. per square inch, tested with three parts sand at twenty-eight days, and the highest tensile strength of Portland cement so tested, which has come under our observation, is 10 per cent. less than that of the slag-cement as recorded above. We must not, however, imagine that all slag-cements give equally good results; we must not generalise from particular instances.

No tests of the adhesive strength of slag-cement have, as far as we know, yet been made, but its capacity for sand shows that this must be very high.

Compressive Strength.—Briquettes of slag-cement, mixed with three parts of sand, were made at Berlin as already described, and were crushed, on an average, by a force of 3,376 lbs. per square inch at seven days, and 4,296 lbs. at twenty-eight days. Briquettes of Portland cement and sand similarly tested by Messrs. Dyckerhoff, had an average strength of 4,822 lbs. at 28 days, or 12 per cent. more than the slag-cement ones.

Uses.—It can be used in all situations for which Portland cement is adapted, and has been employed in the construction of harbours and other works in the sea, as at Skinningrove, in North-East Yorkshire, and other places. For success and plastering and for concrete generally it is suitable. It has been used also for paving, but, according to Mr. Redgrave, it does not attain as hard a surface as Portland cement; its superior adhesive strength, however, enables it to bind the hard aggregate of the paving, such as granite and quartz, "into a firmer mass than Portland cement does." Mr. G. M. Laxford states that its fire-resisting properties "exceed those of both gypsum and Portland cement," and for this reason, among others, it can be recommended for use in concrete floors and roofs, &c.

OBITUARY.

MR. H. H. MACLURE.—The remains of Mr. Hugh MacLure, civil engineer and architect, who died at his residence, Wellwood, Borsdon, Dumfries, on the 31st ult., were interred on the 3rd inst. According to the *Glasgow Herald*, Mr. MacLure was connected with the firm who were engineers for the Glasgow and South-Western Railway, and carried out a great part of the work of that system. He afterwards turned to architectural work, and prepared plans for several schools for the Glasgow and other School Boards. He also erected churches in many parts of the country. The late Mr. Whitelaw, M.P., selected him for the architectural work connected with the churches at Coats and Bellshill; and he carried out four additions to the Parish Church of New Kilpatrick.

MR. ROBERT THOMPSON.—According to the *Liverpool Post*, the remains of Mr. Robert Thompson, for many years Surveyor to the Waterloo Local Board, who was found dead in bed on the 27th ult., were interred at St. Luke's Churchyard, Great Crosby, on the 30th ult.

GENERAL BUILDING NEWS.

KINGSTON CHURCH TOWER (NEAR TAUNTON).—This fine Perpendicular tower has for some time past caused anxiety to its custodians on account of certain cracks, in the eastern and western walls more particularly, which have apparently been increased by an unusual oscillation of the two sides of the tower when the bells were rung, and from other causes. Steps are now being taken to improve and strengthen the structure generally by removing the comparatively modern "rough-cast" from those parts of the walls to which it still adheres, and by pointing the stonework, after all cracks and fissures have been cleared with stones and filled with liquid mortar, and copper bands applied to the dressed stonework on the lines of the cracks. Some portions of the ashlar and the flint stone dressings have not been coated with "rough-cast," and the mellow tone of colour imparted to them by time and lichens of varied hues will not be disturbed. The work has been carried out under the direction of Mr. J. Houghton Spencer, architect, of Taunton.

VILLA RESIDENCES, BURTON ON TRENT.—Several villa residences are being erected in the neighbourhood of Burton-on-Trent, of which Mr. R. E. Carpenter, of Burton, is the architect,—one at Tutbury, for Mr. W. Barker; one on Braunstone-road

Burton, for Mr. C. O. Hall; and two semi-detached in Derby-street, Burton, for Mr. Collyer. The builder for the Tutbury residence is Mr. Dickinson, and for the Burton residences, Mr. Hodges.

CHURCH OF ST. JAMES'S, ROUNDS GREEN, WORCESTERSHIRE.—The new Church of St. James, at Rounds Green, was dedicated by the Bishop of Worcester on the 25th ult. The church consists of nave, chancel, vestry, and organ-chamber, and will accommodate 300 people. The roof of the nave is an open timbered one with hammer-beam principals, and all timber is stained and varnished. The seats are of open pine benches. The church is of oak, with trefoil heads and carved sprandrels. The three chancel windows are of stained glass, executed by Mr. Samuel Evans, of Smethwick, the central subject being the Good Shepherd. The organ is enclosed in a pitch-pine case. The pulpit is of polished oak, with trefoiled panels. The font is of Coade stone, octagonal in form, with shafts of alabaster, and has carved caps and bases. Messrs. Jones & Willis, of Birmingham, have supplied most of the chancel furniture, &c. The whole of the church is heated by hot water, the work for which has been carried out by Messrs. Jones & Atwood, of Stourbridge. The lighting of the church is by gas, and the electric work, together with the altar rail and standards, has been executed by Messrs. Thomson, of Birmingham. The exterior of the church is Gothic in style. The structure is surmounted by a bell-turret. The whole of the work has been executed by Mr. H. Wilcock, builder, of Wolverhampton, from the designs and under the immediate supervision of Messrs. Wood & Kendrick, architects, of West Bromwich.

PROPOSED COTTAGE HOSPITAL FOR NUNEATON.—According to the *Birmingham Daily Gazette*, it has been decided to build a cottage hospital for Nuneaton and district on ground situated near the Midland Railway Station. It is estimated that the cost of the building, independent of furnishing and laying out the grounds, will be 2,000. Building operations are to commence immediately, the architect being Mr. F. J. Yates, of Birmingham.

SCHOOLS, SULHAM, BERKSHIRE.—On the 9th ult. new schools were opened at Sulham, Berkshire. The school has been built not only to meet the requirements of the Education Department, but also to provide a meeting place and room for entertainments, village concerts, &c., and it is designed to accommodate the entire inhabitants of the parish. It is constructed of grey brick and flint, relieved with red brick and Corsham Down stone, the roofs being covered with brindled Staffordshire tiles surmounted by a bell-turret. The work has been carried out by Mr. James Wignore, builder, of Theda, under the direction of Mr. F. W. Albany, architect, of Reading.

BOARDS SCHOOLS, MANOR PARK, ESSEX.—The new schools built by the East Ham School Board at Manor Park were opened on the 21st ult. The schools were designed by Mr. Curtis, the builder being Mr. Reed, of Stratford. The total cost is about 10,500, and, including the provision for cookery classes, the accommodation is for about 940. The children's school is on the ground floor, the girls' school on the first floor, and the boys' school on the top floor.

WESLEYAN CHAPEL, NEWBRIDGE, DEVONSHIRE.—On the 29th ult. two corner-stones were laid of a new Wesleyan Chapel at Newbridge, in the St. Just circuit. The new building will include a wing which will be utilised for Sunday-school purposes, and separated from the chapel by folding screens. The new chapel will seat 150 persons. The architect is Mr. J. W. Tronson, Penzance. The contract is let to Messrs. Gibson and R. Marks, St. Just.

NEW CHURCH, HEDGFIELD, DURHAM.—On the 30th ult. the Church of St. Hilda's, Hedgfield, was consecrated by the Lord Bishop of Durham. The church, which will serve as a chapel of ease in the parish of Ryton, is situated on the main west road. The building consists of a nave, with one aisle. It is capable of holding 350 people, and the cost of the work has been 3,500. Messrs. Oliver & Leeson, of Newcastle, were the architects, and the contract for the building was let to Mr. Pringle, of Newcastle.

MAXWELL CATHEDRAL RESTORATION.—According to the *Manchester Courier*, the lowering of the Cathedral floor, which has been going on in the Trafford and Browne chapels, on the south side, for some weeks, is now being extended throughout the nave. It is expected that the work will be completed by the first Sunday in September. Probably the new south porch will be ready for opening about the same period.

PRIMITIVE METHODIST BUILDINGS, BRADFORD.—On the 23rd ult., the foundation-stone was laid of a new building for the Primitive Methodists of Bradford, to be known as the Central Hall. Its erection will entail an expenditure of 4,700, and the architects are Messrs. H. and E. Marten. On the ground there are to be two large shops, one on either side of the main entrance-hall, which will give access to the chapel and schools. The latter were built twelve years ago at the rear of the chapel. On the first floor will be the Central Hall, a room 55 ft. square. Galleries are to occupy three sides, and altogether there will be accommodation

for about a thousand people. The galleries will be supported on cantilevers, bolted into the outside walls. The contractors for the erection of the building are—Messrs. W. K. Messer, Humphrey & Milson, Joinery, &c.; Mr. Jas. Deacon; plumbing, Mr. G. Jackson; slating, Mr. A. Hill; plastering, Messrs. B. Dixon & Co.; iron work, Messrs. Homan & Rodgers.

CATHOLIC CHURCH, TRARENT, HADDINGTON.—The new Catholic church, dedicated to St. Martin, the erection of which has just been completed, was opened on the 23rd ult. The church has been built from designs by the late Mr. J. Biggar, architect. It consists of nave and chancel, and is seated for about 420 persons. The altar, which is constructed of white Saxon stone, is carved after the Gothic style, with shafts of polished alabaster supporting the altar-table, a crocketed canopy over the tabernacle, and statues set in canopied niches. Together with the chapel-house, which adjoins it, the structure has cost about 2,000*l.*

THE FREE CHURCH AT DUFFTOWN, N.B., which has been undergoing extensive alterations and additions for the last twelve months, was re-opened on the 27th ult. The church is almost of the form of a Roman cross, and is built of Spynie freestone. The most prominent feature in the exterior of the building is the tower, which is situated at one of the corners of the main front and stands about 60ft. high. It rises to the height of 40ft. as a square tower, it then assumes an octagon form and finishes with a spire. The main front is in gable form, and the principal feature is a five-light window, provided through the generosity of Lord Mount Stephen. This is capped and foliated tracery, and, like all the other windows of the church, is filled with stained glass. The whole of the interior finishings are of pitch-pine, varnished. The church is heated by the high-pressure system. Mr. James Souttar, architect, Aberdeen, designed and superintended the work.

CHURCH SCHOOLS, WILMSLOW, CHESHIRE.—New church schools have just been completed at Wilmslow at a cost of 1,700*l.* The new institutions provide accommodation for 300 children. The architect is Mr. H. Lord, of Manchester, and the contractor Mr. J. K. Costes, Wilmslow.

BATHS AND WASH-HOUSES, BOW. The public baths and wash-houses erected by the Vestry of Bow were opened on the 27th ult. by the Chairman of the Commissioners, Mr. Isaac James Booth. The buildings have a frontage of 50 ft. to the Roman-road. Inside are two swimming-baths, one 90 ft. by 30 ft., and one 87 ft. by 30 ft., the larger provided with a gallery to hold 300 persons. There are in the wash-houses forty compartments. The architects were Messrs. Harner & Pitches. All the skylights over the baths, corridors, &c., have been glazed on Rendell's "Invincible" system, sheets of glass as long as 9 ft. 6 in. being used.

CHURCH, EAST LANTON, YORKSHIRE.—A new church is in course of construction at the village of East Lanton, situate about ten miles west of Darlington. It is designed with nave, chancel, transepts, central tower, and south porch; and is in the Late Gothic or Tudor style. The drawings show three-light windows in the nave, two-light in the chancel and transepts, four-light west, and five-light east. The roofings will be of fancy-ironing, springing from moulded wall-shafts, with moulded and carved bases and caps. The tower has octagonal buttresses at the angles, surmounted by pinnacles. The floors of the chancel and aisles are intended to be in mosaic. The architects are Mr. J. P. Pritchett and Mr. H. D. Pritchett, of Darlington, and the clerk of works is Mr. Dodds.

SANITARY AND ENGINEERING NEWS.

MIDSOMER NORTON SEWAGE INQUIRY.—Major-General H. D. Crozier, R.E., held a Government inquiry on the 12th ult. with regard to the application of the Board for a loan for sewage purposes and water-supply. The Chairman of the Board, Mr. F. Bird, C.C., claimed that the scheme was presented on a view to prevent an injunction being applied for by the Radstock Board against them to obviate the nuisance caused by the overflow of the existing sewage tanks into a brook. The system recommended and explained by the engineer, Mr. C. Nicholson Layley, of Westminster, is that known as the international process of precipitation by ferrous and filtration through polarite beds. Dr. Angell, F.R.C., County Analyst, Southampton, was in attendance to describe the chemical action of the process, and in the course of examination stated that the admission of surface-water to a reasonable extent facilitated any process of purification (whether by irrigation or chemical treatment combined with polarite filtration) by reason of the oxygen contained in the water.

DESTRUCTOR, &C., TOXTETH PARK, LIVERPOOL.—On the 23rd ultimo an inquiry was opened at St. George's Hall, Liverpool, before Major-General Crozier, R.E., and Mr. T. W. Thompson, Inspectors of the Local Government Board, concerning the application of the Toxteth Park Local Board for

sanction to borrow the sum of 17,400*l.* for the construction of destructor works, additions to hospital, mortuary, and other works, from the Local Government Board. Mr. John Price, Engineer and Surveyor to the Board, Mr. T. de Courcy Meade, Engineer to the Hornsey Local Board, and Mr. J. A. Brodie, of Liverpool, were called to give evidence on behalf of the Board in favour of the proposed destructor works, to which there was some opposition by the Wavertree Local Board, represented by Mr. J. Dixon, Surveyor to that Board, and certain landowners, represented by Mr. Pain and Mr. Wylie, of Liverpool. The Inspectors ultimately visited the sites of the various works, and will report thereon in due course.

SEWAGE WORKS, GORTON, LANCASHIRE.—The ordinary meeting of the Gorton Local Board was held on the 28th ult., Mr. W. G. Jones, the chairman, presiding. It appeared from the minutes that the Sewage Committee had met three times during the past month for the purpose of considering the sewage scheme for the district and the erection of a refuse destructor, and at the meeting held on the 28th ult. the Committee passed the following resolution:—"That the Board be recommended to adopt a sewage purification works and drainage scheme for the district; that the scheme of Messrs. Lomax & Lomax, of Manchester and Bolton, be approved and adopted generally, without deciding on the chemicals to be used; that a refuse destructor be provided for the district (details to be left to the Committee); that an application be made to the Local Government Board for power to borrow the money necessary; that Messrs. Lomax & Lomax at once prepare the plans and estimates necessary; and that the Clerk (Mr. R. P. Holland) forward the necessary information to the Local Board." The Board approved this resolution without discussion. The estimated cost of the scheme is 23,904*l.*, and of the destructor 3,000*l.*

FOREIGN AND COLONIAL.

FRANCE.—M. Eugene Chaperon, the military painter, has just completed a large mural painting in the officers' library at Fort Valerien.—The State has ordered, at a cost of 30,000 francs, an engraving of a curious picture by Meissonier, representing a scene in the siege of Paris in 1870.—The Louvre has just obtained, for the Renaissance section, a remarkable bas-relief in bronze (Italian work), representing the profile portrait of Cardinal Francesco Alidosi.—A public competition is to be opened in Paris for the construction of the Hôpital Bourcaut, to be built in Rue Vouillé and Rue de Lourmel, by a legacy of the late proprietor of the "Magasin du Marché." The Commission Supérieure des Bâtimens has decided to apply part of the sum granted by the sale of the Crown diamonds to the repair of the national palaces, the Louvre particularly, on which two million francs will be employed, and half-a-million on Fontainebleau and Compiègne. Versailles has already a special fund.—M. M. Barrias and Denis Puech, the sculptors, have just completed a splendid funeral monument which is to be erected shortly in the Saint-Genez Cemetery at Avignon, to the memory of Mme. Paulin Talbot, wife of the former Director-General of the Paris, Lyons, and Mediterranean Railway Company. The monument is at present on view in Paris, at 40, Rue Ampère. M. Lucien Magno was the architect for the general design.—There is talk of selling the sites and buildings of most of the civil and military hospitals at Paris and replacing them by new hospitals constructed in the suburbs. If this project is carried out, only the Hôtel Dieu and the Lariboisière hospitals will be preserved within Paris, as provisions for urgent cases.

LIFE ASSURANCE OFFICES, CALCUTTA.—According to the *Bombay Gazette*, the Standard Life Assurance Company are about to erect, in Dalhousie-square, Calcutta, a new suite of offices, and Mr. F. W. Stevens, their consulting architect, has designed plans for the structure. The principal facade is in Dalhousie-square, and will be 176 ft. in length. The style is Classic Renaissance. The building will have ground, first, second, and third floors. At the north-west angle there will be a tower 142 ft. high, topped by a masonry dome. The material used in the building will be brick and terra-cotta, or brick and white stone. There is a group of sculpture in the main gable representing the Seven Virgins with their lamps, and a colossal figure of Atlas forming a terminal. The arms and monogram of the Company are also freely introduced. Over the main entrance the Royal Arms are carved. Arrangements have been made with the Government to allow the Company to build over the north portion of the premises now used as the body-guards stables, with the proviso that the Government are allowed to occupy the ground floor. Provision in the internal structure of the premises is, therefore, made for the stables. The site of the building is divided in the centre by Vansittart-lane, and it is proposed to bridge the lane on each floor of the building. The interior of the building is designed specially for use as offices. The part of the building to the left of Vansittart-lane is to be made suitable for a bank or a large

shop, whilst the first and second floors are designed for suites of offices. The Company's offices will occupy the third floor, together with residential quarters. Each set of offices has a fire-proof safe, and communication with the upper stories will be by means of a grand staircase and a hydraulic lift. The new building is estimated to cost about Rs. 3,75,000.

MISCELLANEOUS.

CHOIR SCREEN, TEWKESBURY ABBEY.—An oak choir screen, from a design by Mr. J. Oldrid Scott, has recently been erected in Tewkesbury Abbey. The new screen stands under the western arch of the tower, and completes the enclosure of the choir. It consists of a central arch, with openings on each side; the cornice overhangs considerably towards the east and west, and is enriched with a cresting of intricate design as well as with a belt of hanging tracery. The total height from the nave floor to the top of the cresting is about 17 ft. Above this rises the cross, about 9 ft. high, with figures of the Blessed Virgin and St. John on each side, which have been carved by Mr. Boulton, of Cheltenham.

THE ENGLISH IRON TRADE.—In the crude iron branch of the English iron market rather more activity is observable, and in Scotch makers' iron several brands show an increase in value; but Middlesbrough pig is lower. In the manufactured iron department there is little doing, and tin-plates are quieter. The steel trade is a trifle brisker, chiefly in the rail mills. Heavy steel rails exhibit an advance of 4s. per ton on the week. Ship-builders and engineers continue moderately engaged. The coal trade is fairly steady.—*T. Iron.*

THE JUNIOR ENGINEERING SOCIETY.—The Summer Excursion of this Association will commence on Friday, August 12, when the members will leave Euston Station at 5 p.m. for Crewe. On Saturday, the 13th inst., they will visit the Crewe Locomotive Works of the London and North-Western Railway, and proceed in the afternoon to Chester to visit the Cathedral, Castle, &c. They will remain at Chester on Sunday, the 14th, and on the 15th they will visit Messrs. Hulme's Ordral Tool Works, the sewage works of the Salford Corporation, and Messrs. Mather and Platt's Salford Iron Works. On Tuesday, the 16th, they will visit Bolton, where they will see Messrs. Dobson & Barlow's Kay-street Textile Engineering Works; and Messrs. John Musgrave & Sons' Globe Iron Works. On Wednesday, the 17th, they will visit Messrs. Richard Haworth & Co.'s Cotton Spinning Mills and Manufactory; and Messrs. Schwabe & Co.'s Collier Printing Works. The summer dinner of the Society will be held in the evening at the Grosvenor Hotel, Manchester. On Thursday, the 18th, the members will visit the Manchester Ship Canal Works, proceeding from the Pomona Docks, Manchester, to Eastham; thence by steamer to Liverpool. On Friday, the 19th, they will visit the Liverpool Docks, &c., of the Mersey Dock Estate, the Overton Railway, the Alexandra Grain Warehouse, and the Royal Navy Steamship *Trenton*. On Saturday, the 20th, they will visit Messrs. Laird Brothers' Birkhead Iron Works, and will return to London by train from Lime-street at 2 p.m.

THE ROSCOE COLLECTION, LIVERPOOL.—The *Liverpool Mercury* says that "it is at last proposed to remove the valuable collection of old masters' pictures and casts from the Gallery of Art, Colquhoun-street, where they are seldom seen, and house them in the Walker Art Gallery, where they will be easily accessible. Just as it is said that the world knows nothing of its greatest gem, it may be said that the Liverpool public in general knows nothing of the Roscoe treasures contained in the gallery of the Royal Institution. Yet this collection ranks amongst the first three of the galleries in England, and the series of casts, containing those from the Elgin marbles (presented by George IV.), and others, besides some splendid friezes, is one of the finest in the country. It is only matter of fact to state that for thousands who visit the Autumn Exhibition and the Permanent Collection in the Walker Art Gallery, hardly one enters the gallery in Colquhoun-street. The chief portion of the collection of the latter consists of pictures formerly belonging to William Roscoe, and which, on the dispersion of his collection, were purchased by friends and admirers and presented to the Royal Institution. For the last twenty-three years the growth of the gallery has ceased. At present the antiquary is the home of the life-school of the Liverpool Academy."

ENGINEERING TRADES' REPORT.—Messrs. Matheson & Grant's half-yearly report says that trade has gradually slackened since January, and when compared with the activity of the two preceding years, the present position of affairs appears depressing. But just as the recent prosperity never reached the inflated and unsound condition that accompanied the great revivals of 1872 and 1881, so now the re-action is of a milder kind. The swing of the pendulum has a less range. Manufacturing and ironworks have not been unduly extended during busy times; and there is no great excess of productive power; and there is a steady

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Design to be delivered. Includes 'Drainage and Sewerage Disposal Scheme' and 'Church, Offices, and Hall, Falmouth.'

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tender to be delivered. Includes '70 yards of Hasall's Pipe Sewer' and 'Rever, Bucknell.'

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tender to be delivered. Includes 'Fifteen Cottages at Chesham' and '500 and 700 yds. Pipe Sewers.'

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be received. Includes 'Inspector of New Buildings, &c.' and 'Assistant in Surveyor's Department.'

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv, vi, & viii. Public Appointments, p. xviii.

though moderate demand for engineering products, especially at home. Prices are fairly maintained, capital is abundant, and whatever the new enterprises to which it may be applied, engineers must benefit. When the country has settled down after the recent Parliamentary election a solid and improving state of affairs may be reckoned on. On the subject of steel bridges and structures, the report says that this branch of trade still continues active, and as the number of firms with the skill and plant essential to high-class work does not tend to increase, those who are able to satisfy modern strict conditions of quality find employment accordingly. There is a considerable export, but the main dependence of manufacturers is at present on the home railways. Not only bridges for extensions and widening are required, but new steel bridges for replacing old wooden, cast-iron, and decaying wrought-iron structures. While the main girder bridges are being made stronger than formerly to meet the greater weight and frequency of modern traffic, the cross girders and platforms have also to be stronger to withstand the impact of engines having heavy loads concentrated on the driving axles. Skill and experience in the erection of bridges are necessary for work which has often to be done during the running of trains. There is not now so great a difference as formerly between the British and American forms of structure. While the advantages afforded by pin connections are fully recognized here, such systems are only applied to long spans and in combination with solid riveted work. In America, where speed in manufacture and facility in erection used to be the principal points aimed at, the frequency of failures in light, loosely-made, and insufficiently-stayed structures, have, through the consequent expression of public opinion, brought the modes of construction nearer to those which prevail here. Roofs for railway stations and markets are being made, and there is always a demand abroad for such structures. Wrought-iron is not superseded by steel for such work, especially where smithing and welding have to be done.

PLASTERERS' STRIKE, NELSON, LANCAIRESHIRE.—On the 30th ult. the plasterers at Colne and Nelson, Lancashire, struck work, demanding an advance from 7d. to 8d. The masters had agreed to concede an advance of 3d. an hour, but the men declined to accept it.

SURVEYORSHIP, BROMLEY (KENT).—Mr. Hugh S. Cregeen, who has held the office of Surveyor to the Bromley Local Board for upwards of twenty years, having been compelled through continued ill-health to resign that appointment, has since been appointed Consulting Engineer and Surveyor to the Board at a salary of 150*l.* per annum.

HEALTH EXHIBITION AT NOTTINGHAM.—An exhibition of sanitary appliances has been held in connexion with the annual meeting of the British Medical Association in Nottingham, under the joint patronage of the Association and the Nottingham Corporation. The Corporation lent the covered and wood-paved yard (measuring 100 ft. square) at the rear of the Guildhall, and laid the necessary water mains. The patent-jointed drainpipes of Messrs. Parker & Hassall were laid under the stalls, and connected with the nearest street sewer. This complete system of water-supply and drainage enabled all working hydraulic apparatus to be shown in operation.

MEETINGS.

MONDAY, AUGUST 8. Clerks of Works' Association (Carpenters' Hall)—Monthly Meeting, 8 p.m. Cambrian Archaeological Association.—Annual meeting, to be held at Llandovery-Fawr, Carmarthenshire. TUESDAY, AUGUST 9. Royal Archaeological Institute.—Congress at Cambridge. Cambrian Archaeological Association.—Annual meeting, Llandovery-Fawr, Carmarthenshire (continued). WEDNESDAY, AUGUST 10. Royal Archaeological Institute.—Congress at Cambridge (continued). Cambrian Archaeological Association.—Annual meeting, Llandovery-Fawr, Carmarthenshire (continued). THURSDAY, AUGUST 11. Royal Archaeological Institute.—Congress at Cambridge (continued). Cambrian Archaeological Association.—Annual meeting, Llandovery-Fawr, Carmarthenshire (continued). FRIDAY, AUGUST 12. Royal Archaeological Institute.—Congress at Cambridge (continued). Cambrian Archaeological Association.—Annual meeting, Llandovery-Fawr, Carmarthenshire (continued). SATURDAY, AUGUST 13. Royal Archaeological Institute.—Congress at Cambridge (continued). Junior Engineering Society.—Visit to the Crewe Locomotive Works. Estover Engineering Society.—Visit to the Mersey Aqueduct, Tamworth and Norton Water-Tower, by permission of the engineer, Mr. G. F. Deacon.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS. 3,749.—DRAIN-TESTING: H. E. Burnett and W. E. Green.—This invention relates to an improved device or apparatus for testing drains and soil-pipes by means of smoke and smell, but especially the former. The inventors use a case, bent or curvilinear in shape as to its length, and charged with any suitable substance to spontaneously emit smoke and smell upon being ignited. Its rear end may have a case or rod about 6 in. long or more in length, connected to it by a fixed or movable joint. For the purpose of ignition the case may have a quick or slow match communicating with the combustible substance in its forepart, and extending to its rear end or beyond, or the case may be provided with a match or fuse, and an apparatus for igniting it by friction upon pulling a cord, wire, or the like, connected therewith. The rear end may have a hollow chamber for the purpose of inserting a small charge of any suitable explosive substance. The case may be of any suitable shape as to thickness, and of any suitable length. 12,281.—PAINT BRUSHES: C. Barber.—The object of this invention is to design a bridle for paint and calcimine brushes, which will hold the bristles together without interfering with the pliability of the brush, and it consists essentially of a narrow or wide band fitting around the bristles, and pivotally connected to the head of the brush. 12,282.—WATER-CLOSERS: J. Bredon.—A simple and inexpensive apparatus for the flushing of water-closets and other places, and one not liable to get out of order. It is wholly independent of the cistern with which it is used, being connected therewith by a single screw junction. In making the apparatus, the inventor forms preferably of cast-iron, and in a single casting, a siphon, the descending leg being of the ordinary tubular shape. The other or ascending leg is much larger in diameter than the descending leg, and is of such a size and shape as to permit of the reception and working of a flap hinged in the interior and near the bottom of the ascending leg. A lever turning upon a fulcrum at the top of the siphon is so connected with this flap that when the cord or chain attached to the lever for working the apparatus is pulled down, the flap is suddenly

raised upwards. The apparatus is fixed to the cistern by the bottom of the descending leg of the siphon being screwed to the tubery-pipe in the bottom of the cistern. The level of the water in the cistern, which is determined by the ball-cock by which water is supplied, is below the bend of the siphon, and in the normal position of the parts the apparatus is imperforate. When, however, the cord or chain is pulled, the flap is suddenly lifted and the water above it raised to the bend of the siphon, which is thereby set in action, the water in the cistern being delivered by the descending leg of the siphon to the place to be flushed.

1,043.—SCREW-DRIVERS: W. W. Horn.—The object of this invention is to produce rotary motion in a screw-driver by means of helical grooves in the spindle, in connexion with a handle and two pairs of jaws having inclined projections adapted to enter the said grooves, one pair being inclined in one direction and the other pair in the opposite direction, to rotate the spindle in corresponding directions, at the will of the operator, to either drive or draw a screw by substantially the same operation.

1,039.—FIREPLACES: G. Middleton and R. Davison.—This specification refers to a new or improved heating or radiating appliance for use in connexion with domestic fireplaces. It is well known that a large proportion of the heat evolved from the fuel in ordinary fireplaces is wasted, and the object of this invention is to concentrate the heat evolved from the fire to the room, and thus economize fuel. For this purpose the inventors make use of a hollow receptacle, constructed by preference of some good conductor of heat, and in order to afford access to the interior of the receptacle its walls are pierced with holes. The gases evolved from the burning fuel are in this manner attracted to the receptacle, and as the latter is heated in the fire to a red or white heat the gases are heated, thus effecting in a concentrated space an intense heat. It is stated that such an appliance placed in the grate of an ordinary fireplace, instead of increasing the temperature of a room considerably above the temperature obtained from fuel burnt in grates of the ordinary description, while, at the same time, economy in fuel occurs.

9,293.—CHIMNEY-POTS: T. Brown.—This inventor claims to have effected an improvement in chimney-pots, consisting in the pots being fitted with hinged flaps, which deflect downward currents of air from the chimney-pots through orifices in their sides, the flaps being so constructed and arranged that when the chimney-pots are being swept the upward passage of the sweeping-brushes causes the flaps to be thrown back into such a position as not to obstruct the downward passage of the brushes, and that when the brushes are drawn down past the flaps they act on them so as to restore them to their normal position.

NEW APPLICATIONS FOR LETTERS PATENT. July 20.—13,108, J. Anderson, Automatic Air-boots. July 10.—13,176, S. Hill, Window-fasteners.—13,177, J. Collins, Cupboard-turns and Lock Furniture.—13,182, P. Wilson, Automatic Drip-hoop and Stop-tap.—13,206, J. D. Bravides, Road-rails.—13,209, W. Lilly, Filing, Enamelled Bricks.—13,252, C. Baumrath, Water-closed Basins.—13,258, G. Strawsen, Attaching Glass to Greenhouses, Roofs, and other Glazed Surfaces.—13,274, E. Turner, Self-flushing or Sewer Drains.—13,275, E. Turner, Hoops or Sewer Drains. July 20.—13,225, J. Adair, Bakers' Ovens.—13,268, J. July, Dip-pipes.—13,285, H. Hirst, Electrolera and other Electro-dip-pipes.—13,292, W. Lilly, Filing, ornamental or other plates or surfaces of glass, porcelain, or the like material to ceiling-walls, &c. July 21.—13,245, F. Ferry, Water-waste Preventing Cistern and Lavatory or Hand-pump.—13,330, F. Davis, Attaching Knobs and Handles to their spindles.—13,357, W. Downs, Stoves. July 21.—13,328, T. Knowles, Outlets of links, slop-stones, lavatories, baths and troughs.—13,309, J. and T. Clark, Window-sash fastener.—13,416, H. Doulton and R. Mellman, Glazing pottery.—13,421, H. Bealey, Spirit-lights. July 23.—13,435, J. & W. Shedlock, Nails.—13,442, J. Halley, Fasteners for Window-sashes, &c.—13,447, A. Hoyle, Automatic Disinfecter for Water.

SHALFORD.—For enlarging schools at Shalford, Surrey, for the Shalford School Board. Messrs. Peck & Lunn, architects, Guildford. Quantities supplied—
 Wells 2800 0
 R. Smith 615 0
 J. Eastland (Baker) 645 0
 Ellis 445 0
 Downes 645 0
 Johnson (informal) 645 0
 James 641 7 6
 Billmore 636 0

STAFFORD.—For the erection of a new workhouse infirmary for the Stafford Board of Guardians. Mr. Geo. Wormald architect, Stafford. Quantities by the architect—
 Whitloham £4,350
 Lowe 4,185
 Murchard 4,100
 Nevitt 4,081

WINDSOR.—For the construction of new stabling, shoeing, forge, &c., at Thames-street, Windsor, for Messrs. Allnutt & Tennant, Mr. Arthur Vernon, architect, 25, Cockspur-street, London, S.W.—
 Goddard £1,700
 Bowyer 1,750
 Ksarley 1,745

WORKING (Surrey).—For works at Ripley Bridge, Woking, for the Guildford Highway Board. Messrs. Peck & Lunn, architects, Guildford—
 Martin, Walls & Co. £400 0
 Hight & Hammond 250 0

WORLELEY.—For the erection of an infectious diseases hospital at the workhouse, Greenfield, for the Guardians of the Worleley Union. Mr. G. A. Wild, architect, Bank-street, Shaftesbury—
 Lowe & Sons £5,350 0
 E. Powell & Son 5,247 10
 Andrew Smith 4,921 0
 Samuel Warburton 4,479 0
 Tom Atwood 4,281

WYNFAS (Cardiganshire).—For additions and alterations to "Wynfas," for the Right Rev. the Lord Bishop of St. David's. Mr. T. E. Morgan, architect, Aberystwyth. Quantities supplied—
 D. Lloyd £4,246
 John Davies 3,170
 Jenkins Jones 3,028
 Evans & Hopkins 2,984

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ILLUSTRATIONS.

The New Bourse du Travail, Paris.—M. Bouvard, Architect	Double-Page Ink Photo.
Exterior of New Library and Class-Rooms, Uppingham School.—Mr. T. G. Jackson, A.R.A., Architect	.....	Double-Page Photo-Litho.
Sculpture: "Le Connétable Olivier de Clisson."—M. Frémiet, Sculptor	.....	Double-Page Ink Photo.
Saundby Church, near Gainsborough.—Messrs. W. S. Weatherley & F. E. Jones, Architects	.....	Single-Page Photo-Litho.
Brandesburton Church, Yorkshire.—Mr. W. S. Weatherley, Architect	Single-Page Photo-Litho.

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Art in Phrygia, Lydia, Caria, and Lycia.



THE volume in which MM. Perrot and Chipiez have collected their observations on the art and architecture* of these ancient provinces of Asia Minor is one of the steps by which these two persevering

archæologists are gradually approaching what is obviously the great end of their studies, the treatment of the perfected art and architecture of Greece, towards which this and other works from their hands form the preliminary stages. It is therefore obviously in this light that we are to consider such a work as that now before us: as an inquiry into some of the phases of art which preceded and led up to the art of the great period of Greece. The volumes which MM. Perrot and Chipiez have already produced have interest enough, it is true, in themselves, but that interest is doubled when we regard it as all leading up to the perfected art of Greece.

The last work by these indefatigable archæologists was their volume on the archæological remains of the Hittites. The part, according to them, which the Phrygians played in the Oriental world is not so important as that played by the Hittites, "but the modern historian knows next to nothing of the latter, while he is acquainted with the house, parentage, and family of speech of the former." The Phrygians are believed to have had their origin in Thrace, whence they passed over to Asia Minor; but of their Thracian phase nothing is known beyond conjecture. It was in Asia Minor that they developed into a kingdom, in which the names of Gordios and Midas were great, and "linger to this day in Gordion and Midation, where once these kings were enthroned, but which are now reduced to mere hamlets. These names, about which cluster so many fables, are prominent figures in the Phrygian mythic circle; one

might be inclined to regard them as merely legendary, but that they appear on the sculptured façades of the Phrygian sepulchres, written in letters not a whit more difficult to read than very old Greek inscriptions." Curious it is, indeed, to have what we have been used to regard as the absolutely legendary name of Midas brought home to us as that of a real and once powerful monarch, in whose honour façades, whether of tombs or monuments, were hewn out in the rock and remain, recognisably, unto this day.

We have not space to go into the arguments by which the authors endeavour to define the Phrygian chronology. They place the date of the Asia Minor Phrygians as commencing from about the eighth century B.C. What is of main interest to us is that their work is at any rate well before the known work of the Greeks of the Peloponnesus, and that among its remains we may trace some of the efforts in architectural design which preceded and led up to the development of the Greek styles.

As in others of their works, the authors have turned their attention to the structures now in use in the same country, as assisting to elucidate the ancient monuments. They give sketches of the wooden huts of the present day: huts built of timber, in which "the beams for the walls are laid side by side as close as possible, and made to project and overlap each other at the four corners"; leaving, that is to say, ends of beams protruding, exactly as they are shown in stone in the Lycian tombs, though the latter are more regular and symmetrical in their arrangement. This illustration from modern practice is more convincing and more probable than some others which the same learned authors have brought forward, and one cannot but feel that here we may see the survival of the kind of building which suggested originally the rock-cut quasi-Classical tombs of Asia Minor, and gave the rude suggestion for what was afterwards to blossom into Doric architecture.

At the same time, the connexion between the form of timber hut and the executed rock-cut façades of Phrygia is not so close as the authors would seem to imply. The timber hut suggests rather the form of Lycian tomb than the Phrygian. The typical

form of Phrygian rock-cut façade is rather shown in such an example as the one which the authors have called the "Monument of Midas" (fig. 1, see next page). Here the reminiscence of the ends of logs forming the roof is very clearly marked, but the side piers of the façade offer no such suggestion, still less the large diaper ornament which covers the principal part of the space between them. It is only in the small doorway beneath that we really come on the trace of the characteristic feature, that of timbers of which the ends are left protruding. (This doorway, it should be remarked, is only a blind or false doorway.) Another false doorway from a somewhat similar façade (fig. 2), given to a larger scale, shows more clearly the character of this feature. It may be observed that the intel or architrave in this design is said to bear traces of a painted ornament consisting of repeated circles, of which an indication is shown in the engraving. As to the diaper ornament over the surface of the Midas monument, which is far more Eastern than Western in character, the authors make the suggestion, if we understand them rightly (for it is rather vaguely put) that this is a translation into stone of the idea of an embroidered curtain which in actual constructions would have covered the opening. In one example they found traces of colour in this portion of the work; and this would seem to support the idea suggested. This Midas monument (so-called), and other façades of the same type, the authors decline to schedule as tombs; in some cases, it is true, there are spaces behind them, not accessible from the front (the door being always a sham one),—wells which can only be got at by descent from above; in others the façade is cut in solid rock with nothing in the rear. The authors offer the explanation that these are, indeed, monuments in honour of this or that personage, but not sepulchres.

It seems probable that this class of sculptured façade is the earliest of the types found in Phrygia, since it has the least direct relation to the form of architecture which was afterwards to pervade Asia Minor as well as Greece. Farther on, in the façades at Ayazzen, we come upon a style of work which is quite different, which speaks of the same

* "History of Art in Phrygia, Lydia, Caria, and Lycia." From the French of Georges Perrot and Charles Chipiez. London: Chapman & Hall. New York: A. C. Armstrong & Son. 1892.

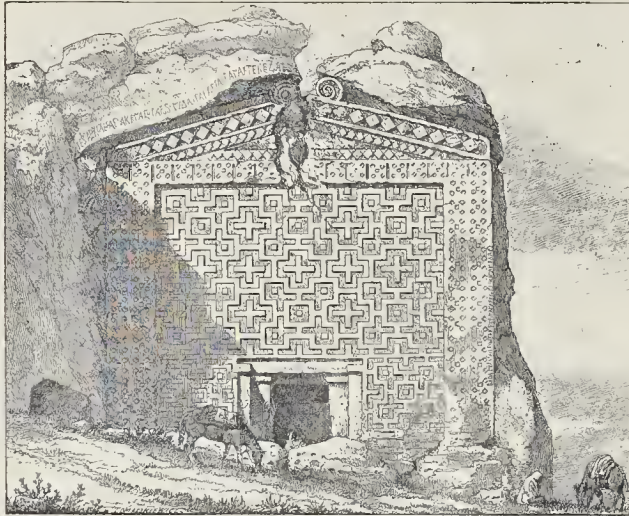


Fig. 1.—'Monument of Midas,' Phrygia.



Fig. 3.—Tomb near Ayazeeu, Phrygia.

influences as those which developed the faades of Lycia, and which belongs to the class of designs which may be called the *origines* of Greek architecture. One of these is shown in fig. 3, in which all the elements of entablature, pediment, dentils, and columns are pretty nearly complete, but the column differs very much from anything in the better-known Lycian examples. But the capital is the most interesting feature. As far as can be judged of on this small scale, it has a distinctly Egyptian appearance, with a suggestion again of the capital of the Temple of the Winds (without the lower foliage). Fig. 4 shows this capital to a larger scale; it is one of the most interesting features architecturally

which the illustrations have to show us. The quasi leaf forms, it will be observed, are sunk, not raised: the necking is decidedly Egyptian in character. We get a step further in the facade shown in fig. 5, which again must obviously, from internal evidence, be later, and in which the elements of Greek architecture show themselves in a tolerably advanced form. Indeed, in the ornaments of the tympanum there seems almost a suggestion of Roman influence, and one would be inclined to doubt whether this facade were not in fact a good deal later than the period to which, according to the hook, it is supposed to belong: a clumsy imitation of Classic art, rather than a suggestion in advance. On the

other hand, in another example, a tomb at Yapuddak, we find the columns on the face connected by "swags" in quite a Roman or even Renaissance fashion, as far as their arrangement goes, although the remainder of

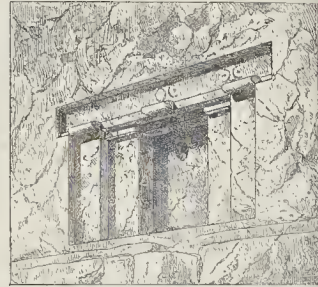


Fig. 2.—Delikli Tach, Phrygia. Detail of Doorway.

the architectural features are of a very rude and primitive character.

While many of these Phrygian remains, however, certainly display early suggestions of Greek architecture, there are other things to be found which seem to have a distinct

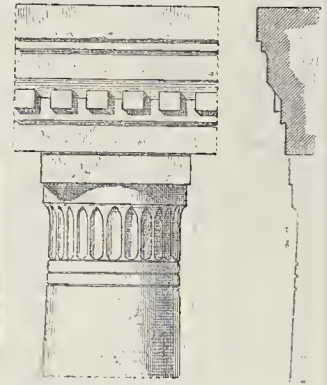


Fig. 4.—Detail of Capital in Fig. 3.

connexion with early remains in Greece itself. The "Tomb of Tantalus," with its central chamber formed by a false pointed arch, the arch stones being in reality corbelled over, reminds one at once of the "Treasury of Atreus" at Mycenae; but a much more

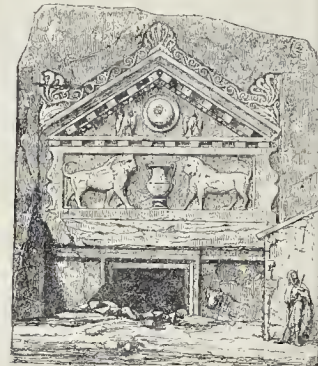


Fig. 5.—Façade of Tomb, Kumbet, Phrygia.

striking coincidence is shown in the case of the tomb in Ayazeeu necropolis, on either side of and above which are sculptured on the rock two colossal lions, reared up and facing each other, with an upright projection

left in the rock between them. The attitude of the animals, the whole composition, recalls the lions of Mycene, though it is on a much larger scale, and the carving, though rude, is a good deal less conventional than that of the Mycene lions; but the general appearance of the whole is strikingly similar; and even the kind of pilaster left between them seems to supply the place of the column in the Mycene sculpture. It really seems strange that the authors should pass this over without any reference to the resemblance, in motif at least, between the two.

Referring again to the peculiar problem presented by the architecture in fig. 5, we observe that on a later page the authors, though they still seem to regard this particular example as incomplete rather than corrupted classic design, observe that the archaeologist must not be too haety in his conclusions in examining this kind of work in Asia Minor. In regard to the Phrygian work they say that "the inference to be deduced both from analysis and comparison alike is that the monuments we have just passed in review form a continuous series, without break or discrepancy."

"We are led by almost imperceptible stages from those of unquestionable hoary antiquity on to exemplars which testify to the inroads Grecian art was making in the inland districts of the peninsula, foreshadowing its complete and final victory. Hence it behoves us to guard against a conjecture, apt to arise in the mind of the archaeologist by superficial and hasty inspection of the façades under consideration. Many a tomb of Caria, Pamphylia, and Lycia [is "Phrygia," intentionally omitted here!] "displays forms which at first startle the student by their seeming strangeness, but when dissected and examined in detail, they turn out to be nothing more than Greek shapes, the poor or clumsy style of which is due to imperfect technique, local habits, or corrupted taste. Thus about this and that structure one had been inclined to think very old there crops up a characteristic feature, a dated inscription which discloses the fact of its being the work of the decadence, of the second or third century A.D."

We should have been rather inclined to think that the Kumbet tomb (Fig. 5) was exactly one of these examples, and the odd thing is that the authors actually notice the fact, in a portion of this tomb, of an inscription in late Greek lettering, but they only apply the natural deduction as to date to a portion of the tomb, implying that it had been interfered with at a later period. The other solution, that it is really a work of late date, is surely the more natural and probable.

The remarks on the early sculpture and ornament found in connexion with these are interesting in a critical sense, and it is no doubt true that in these portions of the Phrygian work there is a great deal more of Eastern or Southern than of Western influence to be traced. Of ornament suggested by plant forms there is very little, but the one example of any importance (Fig. 6) is of interest from its curious mixture of Greek and Egyptian feeling, the latter predominating.

We have not space to go into the less important chapters devoted to Lycia and Caria, but a word must be added as to the more interesting subject of Lycia, which forms the closing section of the volume. In this case it is noted that there is a remarkable uniformity in the style of the monuments, which "present uniformity of aspect from one end of Lycia to the other." The authors account for this by the idea that Lycia possessed federal institutions, "rude and imperfect no doubt, but which served not the less to keep alive the memory of primitive union among all their children." At all events, the similarity of style of the monuments is a great contrast to the diversity found in Phrygia. The general character of these monuments is very well known. The authors give a restoration of the primitive timber type, drawn by M. Niemann, the architect who accompanied M. Bendorff to Lycia. This is simply a re-

translation into stone of the well-known features of the rock-cut monuments, and does not of course prove anything; it is an example of the tendency of French and German archaeologists to evolve from their own ideas what is required to fill up a gap in the architectural history. Some sketches of modern timber structures in Lycia are more to the point, and certainly show in a remarkable degree the same elements of construction as are shown in the rock-cut structures of ancient Lycia.

The volume on Persian architecture, which forms the next of the series, and is also published and translated, we shall have occasion to notice shortly. If the reasoning of the authors is not always convincing, the amount of illustration of ancient art which they are getting together in these volumes, in the way of observation and illustration, will render them a most valuable series of books. The translation is well done on the whole, and the English publishers are issuing the volumes in a style of printing and general make-up which leaves nothing to be desired.

NOTES.

PROFESSOR UNWIN, in his address as President of the Mechanical Science Section of the British Association, dealing mainly with the subject of water-power, drew attention to the curious return which seems likely to take place from steam back to water-power for the driving of machinery, though under totally different circumstances from those under which natural water-power was formerly employed. Mills used to be congregated about streams in order to get the water-power. With the advent of steam it became possible to take the power to the mill instead of bringing the mill to the power. Now, with the capacity for utilizing electricity for the distribution of the power, we seem likely to come back to the water in many cases as a central source of power, which, however, can now be economically distributed to the places where it is wanted. The greatest example of this possible water-power centre is of course Niagara, which is calculated to amount, if the whole stream could be utilised, to 7,000,000 horse-power, or (according to the *Times* report of the address) "more than double the total steam and water power at present employed in manufacturing industry in the United States." It is, from one point of view, somewhat melancholy to read Professor Unwin's observation that "few persons can have seen Niagara Falls without reflecting on the enormous energy which is there continuously expended, and for any useful purpose wasted;" one of those curiously naive admissions which engineers make of their incapacity to see anything except from an engineer's point of view, or even to realise that

of spoiling the picturesqueness of Niagara is still a factor in the case, and that the present ideas of utilising the Falls are to be carried out with the effort to avoid disfiguring them, or drawing off more than a small proportion of the water from above the Falls. The scheme for a tunnel with turbines, leading off from the rapids above the Falls and discharging below them, was tentatively illustrated in an engineering paper some years ago, and the tunnel is now made, the present plans contemplating the utilisation of about 100,000 horse-power. Arrangements, Professor Unwin says, are already being made to transmit 3,000 horse-power to Buffalo, eighteen miles off, to work an electric station. So far this is reasonable enough, but we fear that it is only the thin end of the wedge, and that before many years are over Niagara will be little more than the centre of a manufacturing depot. A great deal of economy of labour will be the result, but one of the grandest scenes in nature will have been ruined, unless a reaction in public feeling takes place, of which we do not see much probability. An interesting point in the address was the account of the use of turbines, at Geneva and Zurich, to raise water from a river of varying and irregular flow (and therefore useless as a motor for machinery) to a high-level head whence the flow is under entire control. As Professor Unwin observes, it seems at first sight an indirect and roundabout way of using water-power, but it is in reality entirely economical.

THE inquest on the Melton Mowbray railway disaster has shown that the facts were exactly as we predicted they would be found to be: it was no "accident," but gross carelessness, and the fault was on the part of the platelayers who neglected the proper precaution of warning the engine-driver, the latter being acquitted of all blame. The verdict alone has deceived our anticipations, and given one more example of the incapacity of coroners' juries to deal with such cases. The evidence is as clear as possible that according to the rules of the company it was the duty of the foreman of the platelaying gang, when carrying out such work on the line as was then being done, to communicate with the signalmen and to have a flag out on the road and a detonator signal fixed at least half a mile from the point of operations; that the attention of the foreman was twice called to this by one of his subordinates, who advised him to send a flag out, and that he refused to take any notice of the suggestion; the unwarned train came up at its usual pace, went over the embankment, and three people met with a terrible and violent death, and the jury return a verdict that the platelayer has committed "a grave error of judgment," and he gets off with a reprimand! We can only say that this is a gross miscarriage of justice. Harwood, the foreman, deliberately broke the rule made to provide for the safety of trains in such cases, not through forgetfulness, but through obstinacy; and if a verdict of manslaughter is not called for in such a case as that, it would be difficult to know when it could be called for. The jury, we presume, were actuated by a sentimental feeling of sympathy for the platelayer. It would have been as well if they had looked at the other side of the case, and thought a little of the slaughtered passengers, and of the safety of the travelling public.

THE address of the President of the Mathematical and Physical Section of the British Association is remarkable alike for shrewd and original criticism, and for the clear and interesting though terse summary that he gives of the main problems concerning the nature of electricity and its connexion with ether, which are now occupying the attention of mathematical physicists. Complaint has been made before now that the routine of education is inimical to originality, but Dr. Schuster is, we believe, the first to express this feeling in scientific matters. It



Fig. 6.—Scroll on Sepulchral Façade, Phrygia.

there is any other point of view. We will venture to say that the majority of those who have looked on Niagara Falls have had something else in their minds than the waste of power. However, as there is no doubt that the perception of the grandeur of natural scenery is a modern and comparatively recent phase of human feeling, it may be that in a few generations we shall have come to regard all this as a vain superstition, and look habitually at waterfalls only from a £. s. d. point of view. The world may be richer then, but it will not be so agreeable. In the meantime, we are glad to find that the dislike of many persons to the idea

is a little startling to be told that Faraday and Joule were amateurs. If, however, we admit Dr. Schuster's ingenious definition, that an amateur is "one who learns his science as he wants it, and when he wants it," we can hardly deny his conclusion. The suggested experiment to test the theory that an electric current is a flux of ether, viz. to try whether a stream of water (which Fizeau has shown carries ether with it) will deflect a magnet near it,—is a peculiarly happy one; and it is to be hoped it will soon be tried. In the latter part of his address Dr. Schuster called attention to the help that the study of astronomical questions, especially those connected with sun-spots, may afford in throwing light on electro-magnetic theories, and he concluded by a list of questions still unanswered, so clearly stated, and so suggestive of the lines investigation should take, as to call forth from Sir G. Stokes the high compliment of a comparison with Newton's list of then unsolved problems at the end of his treatise on Optics.

THE London County Council will deal, after the current recess, with the question of rebuilding Vauxhall Bridge. Their predecessors freed the present structure from toll on May 24, 1879, having bought it for 255,230*l.* Opened in June, 1816, it had cost 300,000*l.*, with 70,000*l.* more for legal expenses. Ralph Dodd's designs for a stone bridge of nine arches, with a 78 ft. span, were adopted in 1809. Owing to disagreements, Dodd was succeeded by Rennie, who was superseded by Sir Samuel Bentham. Bentham in turn gave place to James Walker, who, to reduce expenditure, substituted iron arches, retaining the eight piers whose foundations had already been laid. Timbs, in his "Curiosities of London" (1855) says that the Duke of Brunswick (who fell at Quatre Bras) laid the first stone of the resumed works on August 21, 1813; and the bridge was opened on June 4, 1816. The river here is about 900 ft. wide; the centre arch rises 27 ft. above high water; the bridge measures 36 ft. across; the piers are 13 ft. thick, and at ebb tide the current is unusually strong, inasmuch so as to have scoured the river-bed to below the wooden cradles on which the piers rest. A considerable portion of the ground on the Middlesex shore, in Pimlico, where lay the canals and reservoirs of the Chelsea Waterworks, and the Neat House-gardens, was filled in and raised by the deposit of earth excavated for the making of the St. Katharine's Docks by the Tower, wherof Telford and Hardwick were engineer and architect respectively.

THE last number of the *Journal of the Society of Arts* contains a long report from Sir Henry Wood of his observations on a recent official visit to the Chicago Exhibition. The report shows the work of preparation to be in a satisfactory state. Sir Henry Wood speaks highly of the liberal treatment accorded to this country in everything connected with this Exhibition; "in every building in which we are exhibiting, Great Britain has been assigned a prominent and advantageous position. Had the Commission been allowed to select for itself the various allotments, it could hardly have selected better positions than those voluntarily assigned to it." In regard to the general aspect of the principal buildings, it is observed that there seems reason to expect that "the effect will compare not unfavourably with that of the Paris Exhibition of 1889." We fear this praise will not satisfy the American architects.

"**T**HE Impurities of Town Air" was the subject of a paper read in Section B of the British Association meeting by Mr. G. H. Bailey, D.Sc. He said that during the past twelve months the Air Analysis Committee of Manchester, in conjunction with the Royal Horticultural Society, have been engaged on the analysis of the air of large towns. A

large amount of information having been already collected by previous observers as to the carbonic acid in the air, it was thought desirable to devote more special attention to such impurities as sulphurous acid and organic matter. Furthermore, since the object in view was not merely to collect data, but to lay the foundations of what may be termed Chemical Meteorology, the atmospheric conditions prevailing at the time of the observation have been noted. From the results of several hundreds of analyses carefully conducted in London, Manchester, and Liverpool, the following conclusions are drawn:—1. That in clear breezy weather the amount of sulphurous acid is less than 1 milligramme per 100 cubic feet of air. 2. That in anticyclonic periods it rises very considerably, and in times of fog maxima 34 and 50 milligrammes have been recorded for the worst districts of Manchester and London respectively. 3. That wherever an open space or a less densely-populated area occurs there is a very marked diminution in the amount of impurities in the air. 4. That an increase in the amount of sulphurous acid is accompanied by at least as large an increase in the amount of organic impurities in the air. 5. That smoke, promoting as it does the formation of fog, and preventing free diffusion into the upper stratum of the air, must be regarded as the principal cause of the impure state of the atmosphere in large towns.

IN course of the month, Caldy Island Carmarthen Bay, three miles from Tenby, is to be sold. This is the British Nyus Pyr, measuring $1\frac{1}{2}$ mile by $\frac{1}{2}$ mile, and, in area, 600 acres. It lies on a bed of limestone, which is quarried. Here are the ruins of St. Mary's Priory, founded by Robert, son of St. Martin of Tours, as a cell to Dogmael Abbey. On the 15th inst. is to be put up for sale the first portion, comprising fifty freehold building properties, of Carshalton Park, by direction of the owner, Captain Blake Taylor. Writing to the Countess of Upper Ossory (July 14, 1779), Walpole says Carshalton is as rural a village as if it were in Northumberland, much watered with the clearest streams, and buried in the ancient trees of Scawen's Park and the neighbouring Beddington. The park that is to be sold was formerly known as "Scawen's." In 1726 Thomas Scawen employed James Leoni, architect, to design a magnificent manor-house there, which, we understand, was never begun. Picart engraved the plans for Leoni's edition of Alberti's treatise upon architecture. An article upon Carshalton will be found in our columns of March 1, 1884. The additions to the parish church (1891) were designed by Sir Arthur Blomfield. In the church were set up a monument,—the effigy by Rysbrack,—to Sir William Scawen, and an altar-tomb to Nicholas Gaynesford (*temp.* Henry VII.); his wife wears a remarkably large head-dress.

THE Stationers' Company are about to remove their School from Bolt-court, Fleet-street, to a site which, as we read in the *City Press*, they have bought in Ferme-park, Stroud-green. The School was opened in Bolt-court in 1858, an Order in Chancery having been made in that year for a scheme whereunder the Norton, Bishop, and Meredith charities were applied to that purpose. Thirty years later, the Charity Commissioners framed another scheme for the School's future management. The master's present house (No. 6) stands on part of the site of Dr. Johnson's last home in London (No. 8).* We also read that the Mercers' Company have purchased Barnard's Inn, Holborn, with a view to the erection on its

* It so often is pointed out as being the actual house occupied by Johnson that we may refer to what we said in our columns of December 13, 1884; January 1, 1886 (in reply to a correspondent), and April 14 and 21, 1888.

site of new premises for their School. Originally established in the Mercery, Cheapside, the school has had several habitations. After the Great Fire a plot was reserved by statute in Old Jewry, west side. In 1787 the School was taken to Badge-row, and thence, circa 1806, to Red Lion-court, Watling-street. In 1807 they moved the School to its present quarters on College-hill, planned and designed by George Smith, where Whittington's almshouses,—now at Highgate,—formerly stood, being next to the Church of St. Michael Paternoster Royal, wherein Whittington was buried, and not far from Merchant Taylors' School in Suffolk-lane. The latter School migrated, twenty years ago, to its new buildings (the late E. Tanson, architect) in Charterhouse. In 33 Henry VIII. the Mercers obtained from the King, in consideration of 909*l.* 17*s.* 6*d.*, a grant of lands belonging to the dissolved religious house of St. Thomas Acon, part of which site is occupied by their chapel, hall, and offices. The Company covenanted to maintain for ever a free grammar school for twenty-five scholars (a number since enlarged) within the City. The Mercers' School counts several distinguished men amongst its pupils, including Dean Colet, who founded St. Paul's School; Sir Thomas Gresham; Lionel, Earl of Middlesex, King James I.'s Lord-Treasurer; and Matthew Wren, Bishop of Ely. Of Barnard's, *præus* Mackworth's, Inn, we gave an account on April 21, 1888. At the auction in June of that year the property, which covers about 28,000 feet superficial, was withdrawn, after a bid of 49,400*l.* The Art Workers' Guild then became tenants of the hall, which an astronomical society has lately occupied. On June 9, 1888, we printed a view of the interior of the hall.

THE Consul-General for Spain sends us a copy of the regulations adopted for the International Section of Reproductions from the Art-Industries of all Nations, up to the year 1815, which is intended to form part of the Exhibition of Art-Industries which will be inaugurated on September 24 next, in the City of Barcelona. Further particulars can be obtained at the office of the Spanish Consulate, Billiter-street.

THE present comparative proximity of the planet Mars has again turned some of our scientific minds towards the subject of the possibility of communication and answer by signs with that planet, which is apparently so similar to our own in its conditions, and the inhabitation of which by sentient beings is in the highest degree probable. Mr. Francis Galton, in a letter in the *Times* of the 6th, suggests that flash signals reflecting the light of the sun might be contrived of sufficient power to be seen from Mars with any such optical instruments as we ourselves possess. The first attempt might be the simple expression of a number, with the hope of ultimately receiving a response in a similar form. Once the possibility of any kind of interplanetary signalling were established, the transmission of ideas and intelligible messages would be only a question of time, though perhaps of a very long time. But numbers, geometrical facts, and the elementary processes of logic, must, one would think, be the same wherever there are sentient minds, although the late Professor Clifford did suggest the possibility of a world in which two and two should *not* make four. We have long been of opinion that some degree of interplanetary communication will be established eventually, possibly by the aid of some function of electricity not yet realised, though perhaps not for some centuries. In the meantime, the extraordinary interest which would attach to any, even the simplest and most rudimentary, interchange of signals with our neighbour planet would justify some expenditure in making the attempt, and we hope Mr. Galton's suggestion will not altogether fall to the ground.

STAFFORD COUNTY COUNCIL BUILDINGS COMPETITION.

THE provision of a suitable building for the Stafford County Council, with Council-hall, committee-rooms, and offices, gave rise to this competition, and though the amount of money to be expended is a comparatively small sum, only 18,000*l.*, the amount of interest that has been aroused amongst architects may be gauged by the fact that no fewer than sixty-three complete sets of designs were submitted to the scrutiny of the assessor, Mr. J. Maclear Anderson, the President of the Royal Institute of British Architects. These designs have been publicly exhibited in the Stafford Shire-hall on Tuesday, Wednesday, and Thursday of this week. The premiums offered were 150*l.*, 100*l.*, and 50*l.*, and it may be noted with satisfaction that the competitor placed first is to be employed as the architect, and to be paid the usual fees for professional services, in addition to the premium.

By the assessor's award, the first place is allotted to Mr. H. T. Hare, of London, whilst Messrs. Treadwell & Martin, and Messrs. Cooksey & Cox, occupy second and third places respectively. We have already referred with satisfaction to Mr. Hare's success in the Oxford competition, and we equally congratulate him upon his success in this. Mr. Hare has many times submitted carefully-prepared designs in competitions, and though he has been repeatedly well placed, we are not aware that he has recently occupied the first place in any large competition. The site which has been acquired is in close proximity to the Shire-hall, which naturally occupies a central position in the Market-square. It is proposed to adapt the Chief Constable's buildings in St. Martin's-place, so as to give access to the Council Buildings, which will have a long elevation to St. Martin's-street. This is a narrow thoroughfare, and will not give much opportunity for viewing the proposed buildings, except at rather close quarters.

The scheme indicated in the original instructions issued to architects called for the provision of a Council-hall for 100 members of Council, seats for chairmen of committees, officials, reporters, and a gallery for the use of the public. The arrangement of the seats for the members was made a special feature, and notice was given that any suggestion for seats which would have the effect of dividing the council into parties would be regarded unfavourably. Three committee-rooms and a Chairman's parlour were also required in close proximity to the hall. The first floor was suggested as the best position for these rooms, and this suggestion was universally adopted by the competitors. It was also suggested that the ground floor should have the following accommodation:—Offices for Clerk to the Council and staff, offices for the County Surveyor, and for the Chief Surveyor of Main Roads. Houses for the Chief Superintendent of Police and a caretaker were also required.

We may now refer to the drawings in the order of merit in which they have been placed by the assessor. Mr. Hare (whose design we published in last week's *Builder*) has altered the ground-floor of the Chief Constable's offices in St. Martin's-place and continued the arcade, which exists, to the adjoining Judges' house. The Chief Superintendent's office has been converted into a large cloak-room, opening into the entrance-hall. On entering the vestibule, a porter's lodge is on the right, and a waiting-room on the left. The wide passage-way then turns at right-angles into a large entrance-hall, with the grand staircase to the Council-hall on the upper floor beyond. Turning again to the right, at the foot of this staircase, the main corridor of the office is entered. The remainder of the ground-floor is devoted to the offices. The main entrance to the offices is in the centre of the Martin-street front, and passing through the vestibule a large hall is shown which intersects the corridor already referred to. From this hall the enquiry offices of the several departments are conveniently reached. The Clerk to the Council has two offices on the north-east of the main corridor, and three on the opposite side facing Martin-street. An officers' staircase leads from this department to the upper floor, adjoining the Chairman's parlour. The Surveyor of Roads has three convenient offices opposite the entrance, the drawing office of which has a good north light. The offices of the County Surveyor face Martin-street, and are on the left of the office

entrance. A staircase for the public gallery of the Council-hall occupies a position at the south-west corner of the Martin-street frontage. The lavatories are placed at the back in an attached building, with the passage cross-ventilated. Against Eastgate House Mr. Hare shows a caretaker's house, whilst a very commodious house for the Chief Superintendent of Police occupies the site of the old "Goat Inn." On the first floor Mr. Hare has made a connecting passage from the judge's house which leads on to the landing of the main staircase. The main staircase is a straight one, and has a wide top-lighted corridor running at right-angles to it and the Martin-street front. The Council-hall is placed on the west side of this, and the committee-rooms, the chairman's parlour, and a waiting-room occupy a convenient position on the east side. Another central corridor, top-lighted, gives access to these rooms. The seats in the Council-hall are arranged in segmental lines, the centre being the Chair. The arrangement will effectually prevent the division of the members into parties; but the passages are a very long way apart, and the movement of members from their seats in the centre of the row will be somewhat disturbing to those at the ends. The style of the elevation which has been adopted is the English Renaissance of the seventeenth century, and though it can hardly be said to harmonise with the existing buildings, it is quiet and dignified in character, and as the Martin-street front is cut off by the block of old buildings at the corner, its variety is of little consequence.

Messrs. Treadwell & Martin's designs, submitted under the motto of "Expert," differ from Mr. Hare's principally in the position allotted to the Council-hall, which is at the east end of the first floor. A separate building is provided, adjoining Eastgate House, for the dynamos and other requisites for electric-light installation. The house for the Chief Superintendent of Police faces Eastgate-street, and has the caretaker's house immediately behind it. In St. Martin's-place the entrance is through a hall into a staircase-hall, and from this access is provided to a straight corridor running through the office block. At the west end of this corridor are placed the Chief Clerk's offices, facing Martin-street. Though carefully planned in other respects, this department seems to be a long way from the Council-chamber or the Chairman's room, with which the occupants would be in more or less constant communication. At the east end, on either side of the corridor, are disposed the County Surveyor and the Main Roads Surveyor. The main entrance to offices is in the centre of the Martin-street front, whilst a separate staircase to the public gallery of the Council-chamber is provided at the east end. The arrangement of the first floor places all the committee rooms facing the street and its noise; the lavatories are also placed inconveniently. Messrs. Treadwell & Martin have kept their elevations studiously plain, and treated them in an Elizabethan manner. An elaborate scheme of panelling is shown to the interior of the committee rooms and Council-chamber. The Council-chamber seats follow a segmental line, but two passages have been inserted between the seats, as well as the two near the wall. We are inclined to think this a better arrangement almost than Mr. Hare's, as it divides the seats into three blocks, and gives easier access.

Messrs. Cooksey & Cox introduce one or two varieties into their design. They make a direct entrance from St. Martin's-place, through a porch and vestibule, into a hall containing the main staircase, and from this hall a straight corridor through the office block is accessible. This corridor is of course intersected by the vestibule to the office entrance in the centre of the Martin-street front. The Clerk to the Council's office is on the left of this corridor and faces north, and the adjoining staircase gives easy access to the Council-chamber above. The Road Surveyor's offices face the north, whilst the Clerk to the Council's clerks' offices and the County Surveyor's offices face Martin-street on either side of the office entrance. The lavatories on this floor are conveniently placed. The Council-chamber on the first-floor has been placed at the east end, and it is reached by a corridor from the main staircase, which has cloak-room, lavatories, and a committee-room on one side, and two committee-rooms on the other, facing Martin-street. The sections show rather weak detail, and this is especially noticeable in the hall. The public gallery is

almost on a level with the floor of the chamber, and would have been better had it been further removed from the scene of debate. The elevations are decidedly the best part of the design. They are pleasantly treated with circular windows on the ground floor and narrow windows above, and a hold cornice at the eaves. The line is broken at the end by a gable to the Council-chamber. One of the good points of the design is the elevation to the caretaker's and Police Superintendent's houses, facing Eastgate-street.

There are several of the misplaced designs which are worthy of mention for the care and thought that are shown to have been bestowed upon them. We would mention those of Messrs. E. Guy Dawber and Langton Dennis. The points to be noted in which these gentlemen differ from those already referred to is the use of a small interior area for light and air, the provision of an "Aye" and "No" lobby, which divides the chamber from the street, and this gives additional quietude. The elevations have been kept studiously plain. Messrs. F. C. Ryde and F. D. Bedford may be mentioned as the authors of a carefully-prepared design. The Chairman's parlour is conveniently placed, and special provision is made for reporters. Mr. Wm. A. Pite sends a design which has a corridor surrounding the Council-chamber. This is a good feature which few of the other competitors have been able to introduce. The elevations are cleverly drawn, and show considerably greater merit than the arrangement of the plans.

The arrangement of the designs by the authorities deserves a word of praise; it would have been better, however, if the pre-arranged designs had had a distinguishing mark, so that they might have been found more easily. The assessor has, in our opinion, made the best choice that could have been made from the designs submitted.

THE BISHOPSGATE INSTITUTE COMPETITION.

THE six sets of drawings submitted in the limited competition for the proposed New Institute for the Parish of St. Botolph Without, Bishopsgate, have been publicly exhibited during the past week in St. Botolph's Hall, and possess several points of interest in the treatment of an essentially modern class of building. The site presents especial difficulties, as not only is it irregular in shape and hidden away behind the buildings occupying the frontage to Bishopsgate-street, Brushfield-street, and Duke-street, but numerous ancient lights dominate the area, and cramp the possibilities of the building in every direction. Very limited frontages to the three streets being available,—scarcely more, in fact, than suffice for entrances,—the chief interest of the drawings lies in their planning and their internal treatment. We were, however, scarcely prepared for the almost utter absence of anything like architectural ability displayed by the elevations, which cannot, with hardly an exception, rank higher than the commonplace.

The scheme comprises two main divisions; a Free Library and a Public Hall; besides these are also a board room, caretaker's residence, and the necessary cloak and retiring rooms.

None of the designs appear to have solved the problem in an entirely satisfactory manner, even as regards the provision of accommodation, to say nothing of architectural design.

"Arts and Letters" (which we hear is by Mr. C. Harrison Townsend, F.R.I.B.A., and is the accepted design, as stated in the *Builder* for July 3, p. 32) has one of the best plans, though even this is decidedly faulty in the lighting of important parts of the free library. The public hall is entered from Bishopsgate-street, which is, of course, the principal thoroughfare, and is well arranged, with the necessary cloak-rooms and retiring-rooms, while a further entrance to Brushfield-street, the connecting street between Bishopsgate-street at the front and Duke-street at the rear, affords access to the platform end of the hall, and an exit also when the audience is dispersing. The library is entered from Duke-street, with a corridor on the right, and the lending library, librarian's room, and reference library, in the order mentioned, on the left, and entered from the main corridor, which is continued and joins that at the side of the public hall, and so forms a thoroughfare from front to back, into which the entrance from Brushfield-

street leads at right angles. There is a corridor also separating the library from the public hall, a useful and necessary arrangement for promoting quiet in the library, but insufficient for the proper lighting of the reference library by the small windows shown. Thus the reference library will, we fear, undoubtedly be found insufficiently lighted for use in the daytime, a defect which also exists in a large portion of the leading library. On the first floor, over the library department on the ground floor, and hence leading to the insufficient lighting of this latter, is the reading-room, which, *per se*, is well arranged, with distinct provision for boys and girls, newspapers, and general reading. This part of the establishment is reached by a well-arranged staircase close to the library entrance in Duke-street. The board-room is placed in what can hardly be regarded as an entirely admirable position, on the first floor next Bishopsgate-street, where the noise of that hazy thoroughfare will undoubtedly be a drawback. The elevation next Bishopsgate-street appears to have been inspired by modern American design, and is sadly lacking in repose and dignity, while the interior of the public hall, as shown by the half-inch scale drawing, is treated with rococo detail which it is to be hoped the designer will considerably modify if his design is to be carried out.

"Justitia" has a plan differing in every respect from that of "Art and Letters," and instead of placing the main corridor on one side of the site, as do the majority of the competitors, has this main artery running through the centre with an intersecting corridor leading from the Brushfield-street entrance. This competitor appears to provide considerably less accommodation than some of the others, restricting himself mainly to one-story building, an arrangement which, of course, by means of top-lighting, gets over the difficulties of a two-storied scheme, both in respect of adequate lighting and non-interference with existing rights of adjacent buildings. The public hall is placed at the Duke-street end of the site, and is entered from Brushfield-street. The free library is entered from Bishopsgate-street, with the leading library on the left of the main corridor, and the reference-library, librarian's-room, and news-room on the right. For the amount of accommodation provided we should be inclined to regard this plan as fairly satisfactory, but the elevations are commonplace to a degree, the principal one, to Bishopsgate-street, being apparently inspired by a study of the *Times* offices, which, as our readers are aware, are not of surpassing interest.

"Halfpenny Postage Stamp" appears to have considered a straight corridor to be one of the most important features of his plan. This is placed on one side of the site, and from it are entered the free library at the Duke-street end, and the public hall at the Bishopsgate-street end. There is a good entrance from this latter and a crush-room or hall which makes a good feature in this plan, but sufficient exits are not provided from the public hall itself to the corridors and entrances contiguous. The elevations can best be described as of the commercial type of architecture, and somewhat ordinary examples even of the low type chosen.

"Progress" also makes much of the straight corridor, and as in the preceding design, places the public hall at the Bishopsgate-street end of the site and the free library at the Duke-street end. The public hall has a corridor on each side, an arrangement which has some advantages, but these are rather discounted by the peculiarities of the site. The free library is planned with its reading-room on the ground floor, and the leading library and reference library on the first floor, a disposition which cannot be wholly commended.

"St. Botolph" has committed the singular mistake of making the principal entrance to the public hall, which is placed at the Duke-street end, through the public library, which is approached from Bishopsgate-street, and is placed wholly on the ground floor, with the reading-room on the right of the corridor, the reference library behind, and the leading library on the left. The author appears to have deemed his library as of primary importance, but at the same time seems to have felt that the entrance to the public hall should be from the principal thoroughfare, Bishopsgate-street, although his secondary entrance from Brushfield-street, and his two exits to Duke-street, are really the approaches to the hall. Omitting this matter of the entrances, the plan has

considerable merits, but the question of the entrances is an important one. The elevations are another example of commonplace design of modern Renaissance fashion.

"Plan" certainly helms his motto, as the plan is by far the weakest in the competition, and is, in fact, amateurish, while the elevations are about the most satisfactory of those submitted, that to Bishopsgate-street being a fairly good version of German Renaissance, and those to the less important frontages quietly and soberly treated in a Flemish manner. The author errs fatally in his plan by placing the public hall in the centre of the site, severing the leading library at the Duke-street end from the reading-room next Bishopsgate-street. The board-room is in a good position, near Bishopsgate-street, but not adjoining it, but the placing of the librarian's-room quite by itself, and separated from the library by a corridor, is too great a concession to the desire some librarians have of getting away from the hazy patina of the establishments under their care.

MAGAZINES AND REVIEWS.

The *Gazette des Beaux Arts* commences an unusually good number with an admirable article by M. Henri Lechat on "L'Acropole d'Athènes," one of the most eloquent articles on that fascinating subject that we have ever read. While giving a vivid sketch of the combination of objects of architectural and artistic interest collected on that celebrated hill, the author endeavors to define and characterise the special nature of the interest which attaches to them, and especially to the Parthenon, which he regards as the summary of the artistic greatness and intellectual perfection of the Greek spirit. Rather, he says, could we part with all the Greek literature that has been preserved to us than lose the Parthenon. The whole essay is filled with a noble enthusiasm for its subject, and should be read by all who are interested in Greek architecture. M. H. Bouchot contributes an article on "Portrait Miniature on France"; Baron Gerspach writes on "Les Dessins de Van der Meulen, aux Gobelins"; M. Gayet continues his articles on "La Sculpture Copte" (notice the conventional wolf which forms the tail-piece to the chapter), and M. Paul Leprieux, under the heading "Correspondance d'Angleterre" gives a long critical summary of recent English exhibitions, which, in the light of "seeing ourselves as others see us," will be found both instructive and amusing. He gives the first place to Mr. Watts among English painters; Sir E. Leighton has lived among Greek art, colouring it with tones "gentles, violents, eclairs, et cruels," an English Boudgesean, only more highly coloured, only different from Boudgesean in that he has more style "et parfois des idées." The love of Greece is the plague spot in English art; Sir J. Millais, who once painted such pictures as were to be seen in the Guildhall Exhibition, has been lost in it and come down to the "Chromo-lithographic aimable des Christmas papers." For our sea-pieces alone the French critic has entire admiration. They show the instinct of a whole race for the sea; the English sea-painters live on the sea and know it intimately, they do not merely contemplate it. "Depuis le vieux Hook, qui fut un précurseur, jusqu'à Colin Hunter, Vicat Cole [is he a sea-painter?] les denz Wylie, John Brett, J. R. Reid, Napier Hemy, Allan J. Hook, il n'y avait qu'à louer." This is a little mixed, certainly, but true enough in the main.

The *Art Journal* commences with the first of a series of articles on "Rambles in the Isle of Wight" by the editor, with sketches by Mr. Percy Robertson. We agree with Mr. Huish that "the Island" is underrated at present, but it is at any rate comparatively quiet, and we hope it will not lose this advantage by being written about again. The modern-medieval monument to Queen Eleanor in Lincoln Cathedral is the subject of a short enthusiastic communication from Canon Venables, who does not quite seem to see that the interest of a modern imitation of a decayed medieval monument is not very great, however cleverly it is done. Mr. Norman Garstin's articles on the scenery of the Canadian Pacific Railway are continued, and accompanied by some good illustrations, and the number contains a batch of letters from certain painters to the late Mr. Leyland, including one from Mr. Whistler from which it appears that Mr. Leyland invented

the title of "nocturne" for some of Mr. Whistler's paintings, to the delight of the artist, who says "you have no idea what an irritation it proves to critics and consequent pleasure to me." The "consequent" is good.

The *Magazine of Art* commences with an article on the work of Mr. Onslow Ford, by Miss M. Hepworth Dixon, written in that stilted and affectedly "literary" style which is the bane of modern art-criticism, and seems more than usually out of place in reference to the work of so straightforward and unpretentious an artist as Mr. Ford. Mr. Spielmann contributes an illustrated article on Charles Keene. Mr. Ricketts has drawn a wildly sentimental design in memoriam of Shelley, to accompany a still more sentimental and foolish poem. Mr. Alfred T. Story writes an article on Mr. Bernard Evans, R.I., and his landscape paintings, which are very powerful in their way, and well illustrated in the article; but we cannot say we think this modern fashion of writing critical or laudatory articles on living artists in good taste. Mr. G. T. Robinson's second article on the decoration of ceilings contains some very interesting examples. Mr. Phipps Jackson's article on the Grafton Gallery seems to be a kind of advertisement in advance of the new art gallery, with a plan and sketches. To our thinking there are more art galleries already than we can fill with pictures that are worth anything.

The *Architectural Record*, an American monthly to which we have before referred, contains an article on "Early Renaissance in England," by Mr. Banister F. Fletcher, with illustrations, and one on "Modern Mosaic in England," by Mr. Lewis F. Day, together with a running reprint of Professor Aitchison's lectures on Byzantine architecture, so that it seems an American magazine of this class comes a good deal to England for its writing. There are other articles signed by presumably American names. As usual, the *Record* is very liberally illustrated with reproductions from photographs.

The *Antiquary* includes among its articles one on "Subterranean Dwellings," by Mr. D. MacRitchie; the rest are most continued serial articles to which reference has already been made.

In the *Nineteenth Century* Dr. Jean Paul Richter writes on the "Art Stodentship of the Early Italian Painters," the object being to show the importance and mutual exclusiveness of the local schools of art of the period. He quotes largely from the "Statutes of the Guild of Padua," which certainly seem to confirm his view as to exclusiveness and jealousy of foreign interference with which such guilds were conducted. Colonel Kenney-Herbert contributes on an art which interests us all—the "Art of Dining;" and Major Willoughby Verner treats a subject of great practical importance under the heading "Dungeness or Dover?" recommending "Dungeness" for a great artificial harbor rather than Dover, as being more central and having better anchorage ground, though it would of course have to be fortified.

In the *Century* Miss Mabel L. Todd and Mr. David P. Todd write a joint article of considerable interest, and well illustrated, on an ascent of Fuji for scientific purposes, especially to test the clearness of the air for astronomical observation. The result is reported as satisfactory; double stars were resolved plainly which are usually difficult to resolve, &c. Mr. R. Cleveland Cox has an article on "Gloucester Harbour" (U.S.A. of course) with good shipping sketches by himself. Mr. H. Van Bunt continues the articles on architecture at the Chicago Exhibition, with an illustration of the Electricity Building, which is not however a remarkable design, and it may be hinted that the American architects are blowing the trumpet a little too loud about these exhibition buildings. Mr. C. A. Kenston's article on "The Great Plains of Canada" sketches vividly the characteristics of this strange scenery, where, as he says, there is "a silence that may be heard." It is illustrated by Mr. T. Rennington. Mr. Stillman's article on "Italian Old Masters" deals this month with Paul Veronese, "the greatest of the decorative painters of the sixteenth century judged as decorator simply." The most interesting point in it is the quotation from an account of the painter's examination before the Inquisition for having introduced secular figures into a picture of the Last Supper. Finally the painter, driven into a corner, said "I believe, to tell the truth, that there were only at that supper Christ and the Apostles, but

when in a picture there is a spare space, I fill it with figures of my own invention." When asked the meaning of the armed servants in German dress, he replied that "he worked after the manner of painters and fools, who had no other way to express the fact that the master of the house was rich and lived splendidly." Paolo had, however, to paint the figures out. The whole account is a most curious exposition of the art-philosophy of the Renaissance artist.

Scribner contains a very complete and finely-illustrated article by Mr. N. S. Shaler on "Icebergs." At the conclusion he speaks strongly on the folly of risking encounters with icebergs on the main passenger-ship routes, and recommends that when icebergs come further south than usual the route should be altered for the time; "one day longer on a voyage is better than wreck." A good deal has been heard of this unpleasant subject lately, and the caution should not be overlooked. Mrs. Fields contributes an article on Guerin's "Centaur," chiefly interesting for M. Delort's fine illustration.

In *Harper*, Mr. F. D. Millet's "Black Forest to Black Sea" goes on, with many clever sketches. Miss Woolson contributes a rather sketchy article on "Capri and the Ionian Sea." Mr. T. Mitchell Prudden gives information on artificial ice-making, with diagrams of the "plant." He draws attention to the fact that "all ice from sewage-polluted waters is dangerous," a point to remember during the present threatening of cholera.

In the *Gentleman's Magazine* is an article on the "Old London Potteries," "one hundred years before Wedgwood," by Mr. C. Cooper; and Mr. J. W. Sherer contributes one on the "Old Inns of Salt Hill" in the Eton neighbourhood. Mr. T. B. H. Graham's article on "The Trade Routes of Roman Britain" is a contribution on the "picking up of the lost threads of history relating to the four long centuries of Roman rule in Britain."

In the *National Review* Mr. R. Edgecombe revives the account of the "First Ascent of Mont Blanc," made under the conduct of the guide Balmat of historic name. Mr. F. H. Abell takes the reader a pleasant and instructive walk "Along Hadrian's British Wall." The *Essex Review* for the current quarter contains a good deal of local archaeological and other information, and some notes, with plan and sketches, on Boreham Church (No. 3 of Essex Churches).

Macmillan contains a well-written article on Baalbek, by the Rev. Hasketh Smith, in which he suggests that the gigantic substructure under the platform on which the Greek temple of the Sun was built should be more carefully examined, as showing signs of an older building of an Egyptian character of massiveness.

CAP, WORCESTER CATHEDRAL.

The accompanying drawing of a cap in St. John's Chapel, Worcester Cathedral, has been kindly sent to us by Mr. Greenslade, as a pendant to the illustrations of Worcester Cathedral which appeared in our last.

THE CAMBRIAN ARCHEOLOGICAL ASSOCIATION AT LLANDEILO.

THE forty-seventh annual meeting of this Association opened at Llandello-Fawr, in Carmarthenshire, on Monday last, when the members and their friends assembled in force to hear the inaugural address of the President, Sir James Williams-Drummond, Bart., which was delivered at the Town-hall, at 8 p.m.

As the subject of his address, the President chose a purely local one, the history of Talley Abbey, and gave a very concise account of what is known with regard to its foundation and subsequent benefactors. Much of the information is to be found in Dugdale's "Monasticon" and the back volumes of the "Archeologia Cambrensis," but even those who were already acquainted with the facts were glad to have them recapitulated on the eve of a visit to the Abbey itself. The precise date of the foundation of Talley is unknown, and the absence of any mention of it by Giraldus Cambrensis would seem to indicate that it was subsquent to his journey through Wales with Archbishop Baldwin in 1188. Rhy sap Griffith (the "Rhesus Magnus" of the Confirma-



Cap in St. John's Chapel, Worcester Cathedral. Drawn by Mr. S. K. Greenslade.

tion Charter of the 5th of Edward III.), died in 1197, so that it is probable that the Premonstratensian house in this place was planted in the valley of the Towy in the last decade of the twelfth century. The first authentic reference to Talley is in 1208, in which year King John confirmed a grant of land to the Abbey, here styled the Order of Premonstratensians. At the Dissolution of the Monasteries in 1535, the possessions of the Abbey were valued at £135. 9s. 7d., it being the third wealthiest of the monastic houses in the diocese of St. Davids.

On Tuesday the members left the Cawdor Arms at 9 a.m. for an excursion to Talley and Dolau Cothy, the carriages, twenty in number, forming quite an imposing cavalcade as they traversed the usually quiet streets of Llandello. The weather, which is always so important a factor on such occasions, appeared to be doubtful at starting. The sky was overcast, and the weather-wise prognosticated rain, but fortunately the prophecies of evil to come were not realised. It may be said at once that the whole drive, both going and returning, was a most delightful one in every way. Pleasant companionship—*ca va sans dire*—and an endless succession of views of the green hills and dales of Carmarthenshire, one more charming than the other, prevented the long journeys from place to place ever becoming tedious. Whilst passing through such fine scenery it was impossible not to speculate as to whether, if it had formed the environment of the Saxon he would have developed that keen appreciation of the beauties of nature which seems to be the birthright of the Celt, and which is everywhere so apparent in the place names of Wales.

The first stop was made at Taliaris Chapel, four and a-half miles north of Llandello, which owes its chief interest to its association with Bishop Jeremy Taylor, by whom the building was consecrated in the time of Charles II. Unfortunately the chapel has fallen into the hands of the restorer, a local architect, and is now being so modernised by the usual destructive process employed in such cases that every vestige of antiquity has disappeared. When the operation is complete what was once a quaint old chapel with a distinctive character of its own will have become about as interesting as the modern villa residence of a retired tradesman. Within the chapel is the tomb of Lord Robert Seymour.

After leaving Taliaris Chapel, the party proceeded to Talley Abbey, three miles further north. Here the architectural peculiarities of the building were explained by Mr. Stephen W. Williams, F.S.A., under whose direction the recent excavations have been carried out. The Abbey has long been in ruins, and hardly any-

thing remains above ground besides the northern and eastern walls of the central tower, with the high pointed arches opening into the transept and the presbytery. The excavations have disclosed the greater part of the plan of a cruciform church with transeptal chapels. The piers of the nave are quite plain, and those of the central tower have a simple roll moulding on the angles. No sculptural details of any kind have yet been found, and most of the work must have been as devoid of ornament as most of the churches in the neighbouring county of Pembrokeshire.

Immediately to the north of the Abbey are two lakes, as might have been surmised from the name Talley, which is an abbreviated form of the *Tal-y-Llycham*, or Head of the Lakes. The situation is altogether a most charming one, in the midst of pine-clad hills.

The party proceeded on foot to inspect a curious mound on the low-lying ground between the two lakes. The Rev. Charles Chidlow, who has investigated the site, believes it to be the foundation of a crannog, or lake-dwelling, although it may turn out eventually to be sepulchral.

At about one o'clock the party reached Edwinstford, the residence of the President, Sir James Williams-Drummond, Bart., where luncheon was provided. The house is an old one modernised, but contains some good ceilings with ornamental plaster-work of the Jacobean period.

The next place visited was Dolau Cothy (fifteen miles north of Llandello), the seat of Lieutenant-General Sir J. Hills-Johnes, V.C., K.C.B. Here the Roman gold mines and early inscribed stones occupied the attention of the archeologists.

The last stop was at Cymfil Cayo church, which has a massive tower and an inscribed stone built into the north wall of the nave.

A long drive back to Llandello of fifteen miles concluded the day's excursion.

At the evening meeting papers were read by Mr. Stephen W. Williams on the architecture of Talley Abbey, and by Mr. Edward Owen on its history.

We will continue our report of the meeting next week.

BATHS, &c., COMPETITION, KINGSTON-ON-TRAMES.—We are informed that the Town Council has awarded the first premium for a design for the proposed new swimming-bath and extension of the Queen's Promenade to Mr. Edward Carter, A.R.I.B.A., and the second to Mr. W. H. Hope, both practising at Kingston. The design includes swimming-baths for men and women, constructed on the river foreshore beneath the promenade.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

WE now conclude our report* of the evidence given before this Commission up to the time of its adjournment for the summer recess.

The Flow of the Lea.

Mr. J. Child, Engineer to the Lea Conservancy, handed in supplementary tables of the minimum flow of the river Lea over Fildes's Weir during the four driest years known—1874, 1884, 1887, and 1891. The summary is as follows, the mean being given for a day, a week, a month, and three months:—

	For a day.	A week.	A month.	3 months.
1874.	13,320,000	15,939,000	17,478,000	20,709,000
1884.	19,080,000	21,815,000	29,201,000	33,657,000
1887.	18,261,000	19,431,000	22,195,000	23,937,833
1891.	13,356,000	20,106,000	21,078,000	23,230,000

Full details were appended. In reply to the Chairman, the witness said that the weir being above the East London intake, if the Company require more water than is passing over they must take it from wells or from storage. The amount taken by the New River Company was uniform, because it could not be changed without altering the gauge, and therefore no abstraction accounted for any difference in the flow over the weir. There was no rule of correspondence between the rainfall and the flow over the weir.

Mr. Francis informed the Commission that the Company took their full quantity of water (viz., 22,500,000 gallons per day) from the Lea during the following times of minimum discharge over Fildes's Weir—1874; July, August, and September, 1884; Seven days in August, and throughout September, October, and November, 1887; Seven days in July and throughout August, September, and October, 1891; Throughout July, August, and September.

The County of Kent.

Mr. R. G. Mallen, on behalf of the Sanitary Authorities of Bromley and Beckenham, said they had formed a joint committee with the object of obtaining the control of the water supply within their districts.

The Chairman: That point, of course, is beyond the scope of our inquiry.

Mr. Mullan handed in a statement made by Sir J. F. Leonard, of West Wickham, Chairman of the Kent County Council. It gave figures to show how rapidly the population was advancing in the districts of the Beckenham, Bromley Urban, and Bromley Rural, Sanitary Authorities, and stated that the water supply in the chalk underlying the districts was being drawn upon by the Kent Company for the supply of other districts. This use of the water ought not to be allowed to extend, because it would be required locally.

Asked by the Chairman for information to show that water for local needs could be got within the districts, Mr. Mallen referred to a report made in 1891 by Messrs. Bailey Denton, Son, & North to the effect that two of the Kent Company's engines had been working day and night for years without lowering the water more than a foot; and Sir A. Gekie remarked that that was rather evidence that the water was sufficient for both local and other needs.

The witness said that the inhabitants of the district had not experienced any deficiency as yet, but there were thousands of acres yet unbuilt upon that were being rapidly developed.

Metropolitan Essex.

Mr. W. D. Whittingham, Chairman of the Essex Metropolitan District Water Supply Committee, said that the parishes of West Ham, Chigwell, Chingford, Loughton, and Waltham Holy Cross, with a population of over 351,000, were served by the East London Company, and, on the whole, satisfactorily; but anxiety as to the sources of supply was heightened by the rapid growth of the suburban districts of Walthamstow and Leyton, which doubled in population each census. They had two sources of supply,—from the Lea and from the wells,—and the well water was much the better of the two. The Lea was exhausted; any increase of supply must come from the wells; and in the future Essex would require all the water to be had from that source. Therefore, he asked for a separate Water Authority for the district.

The Chairman: We have nothing to do with that, and we must not go into it.

The witness said he believed that a portion of the district was supplied exclusively by well

water, and that locally-made analyses had indicated where the well water and the river water blended; but

The Chairman pointed out that the reservoir supplying that part of the district could be filled at the option of the Company with either river water or well water.

The County of Surrey.

Mr. H. Yool, J.P., Chairman of the Sanitary Committee of the Surrey County Council, and for many years Deputy-Chairman of Quarter Sessions, gave the Commission information as to the authorities charged with preventing the pollution of the Thames and the Lea. They are (a) the Conservators of the Thames, as regards that river and any stream communicating with it above the western boundary of the Metropolis and within ten miles of the Thames measured in a direct line; (b) the Rural and Urban Sanitary Authorities through and by whose districts the streams may flow, who have jurisdiction under the Rivers Pollution Act, 1876, and the Public Health Act, 1875; and (c) the Councils of the counties through or by which the streams may flow, the Act of 1888 giving power to contribute to the cost of prosecutions instituted by other authorities, and power to constitute a joint committee of the Councils or other bodies representing all the administrative areas of the counties. But, in the Lea Valley, the Sanitary Authorities have no jurisdiction, and the power is reserved to the Conservancy, which is the only exception to the general provisions of the Act. In the Thames Valley the duty devolves primarily upon the Urban and Rural Sanitary Authorities, and a concurrent jurisdiction is given to the County Councils and the Conservancy. The County Council naturally desires to avoid anything like friction with the Conservancy.

The Chairman: Partly on the principle of never doing yourself what you can get any one else to do for you.

Witness: No doubt. If I say to a Sanitary Authority, "You ought to put on another inspector," I am met with the statement that the Conservancy gets 18,000 a year for doing the work. The witness, continuing, said that the Surrey County Council have endeavoured to work through the Sanitary Authorities, and have not found it necessary themselves to take legal proceedings. From the evidence tendered by the Thames Conservancy it would appear that they were the only body taking up this work, whereas it was really being done with some efficiency by other bodies. The Surrey County Council had appointed Dr. Edward Seaton Medical Officer of Health. The tributaries that go through or bound the County of Surrey are the Wey, the Wandale, and the Mole. The attention of the County Council has been chiefly given to the Wey and the Wandale. The condition of the Wey is very unsatisfactory. It is greatly polluted by sewage, especially from the boroughs of Godalming and Guildford, and by matters discharged from tanneries and paper-mills. The paper-mills have been a very great trouble. The effluent is large in quantity, and there has been difficulty in dealing with it. Messrs. Spicer, the proprietors of the Cattersole mills, have expended over 3,000*l.* in attempts to deal with their effluent, and have failed. The tanneries are about Godalming and Guildford, and are being dealt with by the Guildford Sanitary Authority with some success. There has been one prosecution at the Assizes, where an arrangement was come to under which the pollution will be dealt with satisfactorily. An agreement has been come to with landowners for an area of land sufficient for filtration, so that nothing will pass into the Titchingbourne without filtration. The tannery of Messrs. Wray will be taken into the Godalming main drainage scheme, and the discharge will be treated with the sewage of the town. The County Committee have had many conferences with local authorities to induce them to press forward sewerage schemes. At the instance of the Chertsey Rural Sanitary Authority, twenty-six drains have been out off from discharging into watercourses. At the Gordon Boys' Home at Chobham an engine raises the slop water, &c., and throws it over a hill so as to put it on land in another watershed. Godalming has adopted a precipitation and filtration scheme to be worked on eighty acres of land. In Weybridge and Chertsey nothing has been done since 1888. The sewage of Godalming, going into the river, has conveyed enteric fever to

Guildford, where the river water was drunk unfiltered. The stoppage of two road-drains at Weybridge produced serious illness and one death. When a district is provided with a water supply there ought to be sewers to carry away the water brought in. A good deal of water flows into road drains, and it is got rid of nobody knows how. Pollution is not stopped in the district. Although twenty-six drains were cut off last year, as many or twice as many remain. Cases are found out because reported illness brings down the Medical Officer of Health. In March diphtheria broke out at the Bisley Farm Schools, where there are 170 boys besides officers. Everything was flowing into a foul cesspit and thence into the Bourne. That had been going on for years, and never discovered by anybody. It is all being remedied under a scheme laid down by the Rural Sanitary Authority.

The Chairman: That obviously is a means of finding out pollutions which, while at the disposal of the Sanitary Authority, is not at the disposal of the Conservancy.

Witness: It is not at the disposal of the Thames Conservancy; there is no doubt about that. The Bisley schools have been in the public papers many times, and the Thames Conservancy has been active in the district since this Commission has been sitting. The Surrey County Council hold it to be their duty to carry out the Rivers Pollution Act. Surrey has the deepest interest in keeping the river pure, and will prosecute this work with the support of Middlesex and London, and probably of every County Council in the district.

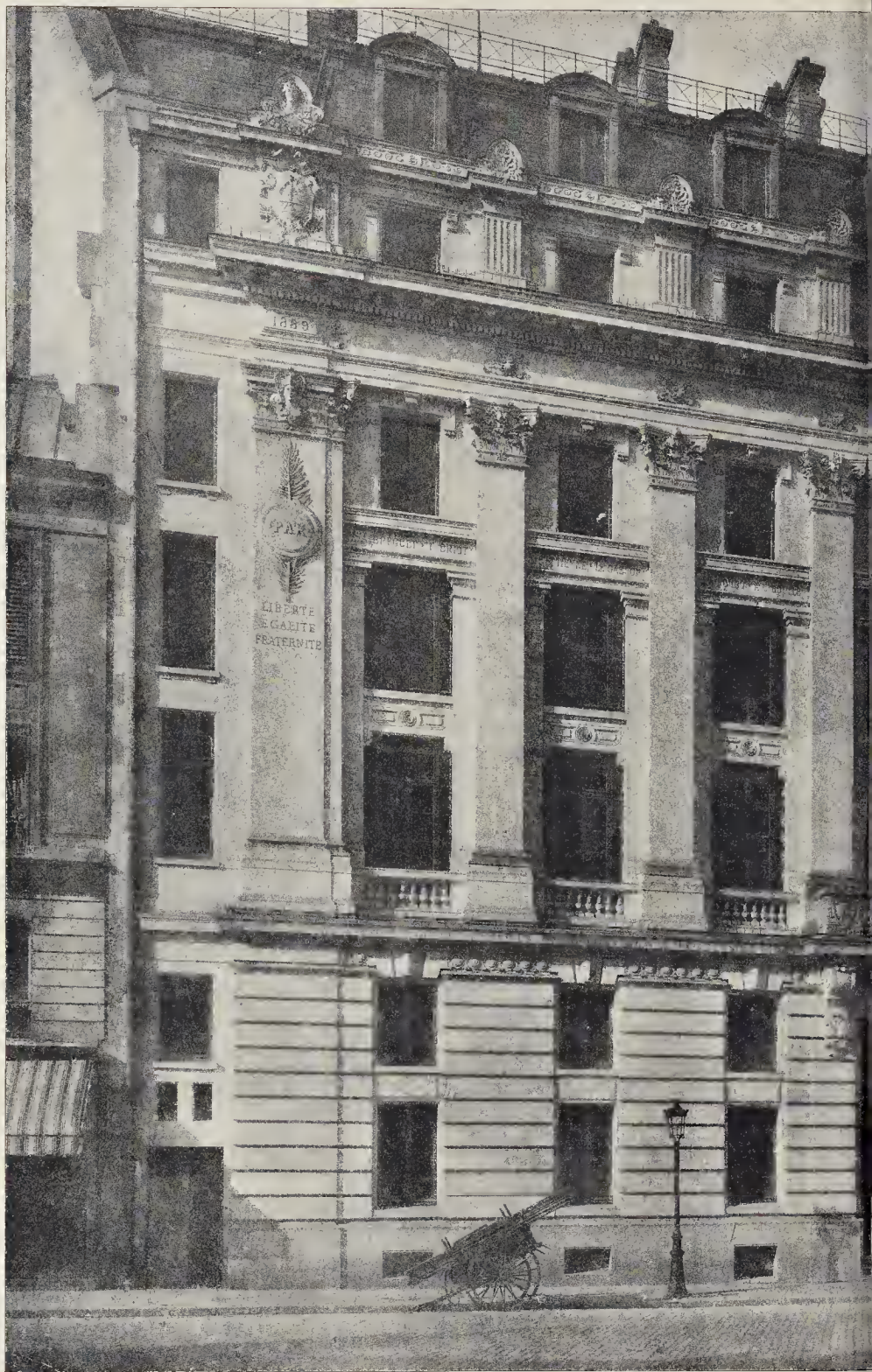
The County of Middlesex.

Mr. R. D. M. Littler, Q.C., Chairman of the Middlesex County Council, handed in a return of the Urban and Rural Sanitary Authorities in the Council's administrative area, the acreage and the populations in 1881 and 1891, the total in the latter year being 560,328. Of this number, 364,100 were supplied by one of four companies,—Grand Junction, West Middlesex, East London, and New River. There were local supplies for 196,228, in eight urban districts,—Enfield, Finchley, Friern Barnet, Harrow, Southall, Norwood, Teddington, Uxbridge, and three-fourths of Tottenham; and in five rural districts, viz.,—Barnet, Brentford, Hendon, Staines, and Uxbridge. Mr. Littler gave many explanations by the aid of a large map, and urged that the people of Middlesex claimed that, if water were taken from the Thames, they ought to have, if not the first drink, at all events as much in proportion as London takes. They also feared that the sinking of deep wells by the companies would affect their well supplies; and Mr. Littler believed that the water in the gravel did not come from the Thames, although it would ultimately find its way to the river. Some local wells had been drained, but they did not go down into the chalk, they were all in the gravel. This gravel water was largely carried away by drains cut through the gravel beds.

Mr. Wm. Kitteringham, Surveyor to the Enfield Local Board, said that the water in one of its wells,—the Eagle House well,—used to rise to 40 ft. above Ordnance datum and flow by gravitation through a conduit. The level gradually got lower and lower, and in 1884 the conduit was lowered. Then the supply failed. At present the water stands at 32 ft. above Ordnance datum, and for about eight years has had to be pumped. The pump is put down 70 ft., and, although a good supply is obtained, the water level is falling continuously. The Local Board's wells do not affect each other; and he attributed the described depletion to the Hoe-lane well about a mile and a half away. In sinking a new well at Ponder's End, when they penetrated the chalk they found that, when pumping ceased at Hoe-lane, the influx of water increased by something like 70 or 80 gallons a minute. The Hoe-lane well was 200 ft. in depth; the boring of the Eagle House well was from 250 ft. to 300 ft. in depth. The East London Company had a piece of ground within 50 yds. of the local well, and if they sunk a deeper well they could deprive the neighbourhood of its water supply; but well-sinking would not affect the surface waters. The local supply was taken from the chalk, and knowing the direction in which the water came, and where the chalk cropped out, they feared that the supply would be injuriously affected by the sinking of wells outside the district. In twenty hours a day the Board's well yielded from

* See last volume of the *Builder*, pp. 415, 435, 456, 490, 503; and current volume, pp. 10, 22, 47, 71, 82, 103.







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—M. BOUVARD, ARCHITECT.

600,000 to 700,000 gallons,—from 20 to 25 gallons per head per day.

Mr. T. S. Tilley, who was sinking the new well at Ponder's End for the Enfield Local Board, said that from 2 a.m. to 8 a.m. the yield was increased by 80 to 100 gallons a minute, and his explanation was that in the early morning the New River Company were not pumping. Once the water became creamy, and he surmised that it had come through a fissure, and cleared it of chalk. He handed in a list of wells that were sinking. (This list was given in the *Builder* a fortnight ago, p. 83. In the case of the well at the Small Arms Factory the depth ought to be 18 ft., and not 19 ft.)

Mr. John Mercer, landowner, brewer, and formerly millowner on a stream known as the Frays, near Uxbridge, believed that the Colne had diminished in volume 20 per cent. during the last twenty years, and was examined as to the grounds of that belief. A well was sunk at the Colne Brewery in 1875, and the water came high enough to flow over an overshot-wheel which drove pumps and supplied the brewery. When other artesian wells had been bored the water would not flow to the top of the wheel, and the overshot-wheel had to be converted into a breast shot-wheel, and made to go the other way, which diminished the power, fall, and quantity. He attributed this to the sinking of wells by the Colne Valley Water Company. The falling-off in the Colne he attributed to deep borings throughout the chalk area. When pumping began at West Hyde, Hertfordshire, between Rickmansworth and Uxbridge, it affected the levels of the wells in the neighbourhood of Uxbridge.

The Chairman: It is easy to say that; but we should like to have some proof of it.

Witness: I am convinced in my own mind that there was a diminution in the flow of my own well.

The Chairman: But I want you to convince me.

The witness said that the supply to the Uxbridge town wells had fallen off, and it became a question how the increasing population was to be supplied, and he attributed this to increased pumping by others.

Mr. Hill: I suppose you look upon the water in the chalk as being practically one body,—an underground reservoir, as it were?

Witness: I look upon the chalk as an underground reservoir, and there are different strata of flint in the chalk.

Mr. Hill urged the importance of rainfall as a factor in the flow of the Colne.

Witness: When you are dealing with a river like the Colne, that is supplied mainly and almost entirely from deep springs, as all its tributaries are, it is different.

Mr. Hill: Are not the deep springs fed by rainfall?

Witness: Yes; but the rainfall does not get down to the chalk in days or months.

Mr. Hill: Unless you have the actual facts, you are making a comparison that is not of much use. Do the springs issue at a lower level than they used to do?

Witness: Where they can; but in many cases the once nice round head has become flattened, indicating less power and flow; and many springs on the hills have ceased.

The County of Buckingham.

Viscount Curzon appeared to represent the general feeling in South Buckinghamshire that any large scheme for taking water from that part, from the Thames and the Colne especially, would seriously damage the water supply of the districts watered by those two rivers. Asked what the fear was of storage or of deep wells, he said the people did not want to see any water at all taken from that part of Buckinghamshire, as the water supply was only just sufficient now for the needs of the localities. People were agreed that any large scheme for taking water would seriously affect the wells and the water-level generally.

The Chairman remarked that this caveat would be properly entertained when a general scheme had been propounded.

Asked by Sir A. Geikie whether any scheme had been carried out which had affected the water supply, Viscount Curzon said he was not aware that any schemes had been carried out, but the Grand Junction Company had promoted a Bill to increase their supply by water taken from the Thames at Dorney, between Windsor and Eton, and that Bill was successfully opposed in the House of Commons. So far as he knew,

nothing had been done recently to tamper with the water-supply of the county.

Mr. Wm. Garney, farmer at Chalfont St. Giles and Chalfont St. Peters, and an Alderman of the Buckingham County Council, said that he was of opinion that deep wells with a constant draught would completely drain the whole available water supply. He had "6 or 8 or 10" wells on his farms; and, if you sank one deeper than the rest, it drained them all. His two farms were in the valley of the Misbourne, between Missenden and Wendover, about seven miles from where the Misbourne joins the Colne, and the wells were from 15ft. to 35ft. deep, according to the level. The farms were two miles apart, but wells were not affected at that distance, only wells immediately contiguous. He was a miller on the Misbourne stream, and the power was now less than it was 15 or 20 years ago. Last year the Misbourne was comparatively dry. After a heavy rainfall, there was a fair amount of water. There was no artificial draught upon the stream, except wells for domestic supply; and there were no deep wells. The stream ran through porous gravel, and the wells were sunk into the chalk. There was plenty of water in wet seasons, and he had not noticed any loss of water, except the difference in the flow when there was no rain. He knew, to his cost, that we had been passing through a cycle of very dry years. The source of the Misbourne varied with the rainfall. Asked what evidence he had that deep wells would affect the water-supply, he said his fear was, in a great measure, imaginary, and he had no direct evidence, because he did not think there was a deep well along the valley. The population of the district was increasing, and there was a good deal of building going on.

The Chairman said that the views of the witness might be fairly considered if any definite scheme were propounded by a public body.

Mr. Wm. Hearn, steward to Mrs. Gerald Goodlake, of Denham, in Buckingham and Middlesex, on the Colne, and four miles from Rickmansworth, said that the Savoy was a Buckinghamshire arm of the Colne, which worked a water-wheel, and returned to the river. Wells had been sunk by Mr. Webster, of Harefield, and they had lowered the springs, for as much water did not come down the streams as formerly. Fish culture was carried on, and less water than before passed through the artificial weirs and the tanks. It was a "fancy" he had that the falling-off was to be attributed to the wells. In like manner he fancied that a well which supplied Rickmansworth had affected other wells, and also the stream. It was not the exceptionally dry seasons, because the falling-off was felt in winter and after heavy rains. Although it was a "very springy district," the streams were not mainly dependent upon springs, because there were many tributaries. Even after heavy rains the river was not so flooded as it used to be, and something must take the water away. The Harefield wells were used only for the estate, and they are about a mile from the stream.

Sir A. Geikie: The Commission would like to get some definite information as to how you imagine the level of the springs and of the stream would be affected by these Harefield wells. It is not quite clear from your statement that it is so affected.

The County of Hertford.

The statement submitted by the Hertford County Council represents that the county supplied 70,000,000 gallons of water a day for the use of London. The question is whether this enormous drain on the resources of the county is to continue or is to be restricted. The New River and the East London Companies claim to be entitled to take practically all the water of the Lea, and also, both as landowners and under their Acts, to sink wells and pump unlimited quantities of water for the metropolis. The use of these powers has largely depreciated the value of water rights in the county, and the value of property, and is a serious drawback to its trade. The water left for the consumption of the county is inadequate. The county ought to be protected against an excessive drain, and it ought to have secured to it the first use of its own water. The Council cannot obtain accurate information as to the nature and extent of the Companies' existing works; and such information ought to be given to the Commission. When the Waterworks Clause Act was passed, whilst the inhabitants

of the metropolis were organised, those of the counties were not; had they been, the London Companies would not have been exempted from many of its provisions. The quantity of water to be taken from the Thames is strictly limited; but the whole visible supply of the Lea is sometimes taken. Wells and watercress-beds are sometimes sucked dry, and streams often rise four miles from their original sources. Water pumped from wells within the watershed of the Colne and carried away out of it will affect the flow of the streams.

Statistics of Population and Supply.

Mr. A. C. Waters, charged with the working of the Statistical Branch of the General Register office, said that at the request of the Commission, and under Dr. Ogle's supervision, he had superintended the preparation of a number of tables. One gave the population and present area of Registration London at each successive census from 1801. The area had been altered from time to time, but the figures given related to the same area. The second table gave the death-rates per million living from typhoid fever in London and other large towns in the last two decennia. The general result was that the death-rate in London from enteric fever had been lower than in any of the other twelve towns included in the table. A third table gave the average annual deaths per million living from sundry diseases, in districts of London grouped by the sources of their water supply. The table shows that the death-rate from enteric fever in seven years was higher in the parts supplied mainly from the Lea than in the other groups which have their water from other sources. It was higher in those same districts from certain other diseases,—measles, scarlet-fever, diphtheria, and whooping-cough. Although enteric fever was capable of being diffused by drinking water, it could not be concluded from these tables that Lea water was the cause of that rate of enteric fever. Another table related to the future population of Greater London, defined as including all parishes wholly or partially within fifteen miles of Charing Cross. The area is 701 square miles. The populations were:—

	Increase per cent.
1861	3,222,720
1871	3,885,641
1881	4,766,061
1891	5,693,332
For thirty years	74.8
" " annually	1.87,902
For the last twenty years	45.0
" " annually	1.87,442
For the last ten years	18.2
" " annually	1.63,458

The diminished rate of increase in the last decennium was 19.8. Table IV. gave the results of four calculations as to the future population of Greater London on the hypotheses of certain rates of increase. In 1921 it would be:—

On the 30 years' basis	9,893,032
" 20 "	8,879,519
" 19 "	9,337,542
On the hypotheses of a continuous decrease in the rate of growth	7,915,895

By an elaborate process it was ascertained that the population of the entire Thames basin was 6,973,392; of the Lea basin above the New River intake, 90,412; above the East London intake, 189,287; total, 7,019,967.

Mr. Alex. Dickson, of the Kent Company, handed in various returns as to population and supplies. The first gave the number of houses in a defined district as 78,976. According to the census there was in these houses a population of 491,652, which gave an average of 6.23 for each. The Company's first estimate was 460,524—a difference of about 31,000. There were 7,000 of these houses not supplied by the Company. They were in the rural district, where the average number of inmates would be 5. Deducting 35,000, the number was about 3,000 below the Company's first estimate, which was, therefore, correct within a small margin. The return contained the following details:—

	Greenwich.	Plumstead.	Bromley.
Houses supplied	9,122 ..	8,578 ..	3,879 ..
Other supplies	249 ..	122 ..	84 ..
Totals	9,371 ..	8,700 ..	3,963 ..
Census, — Inhabited houses	8,987 ..	8,629 ..	3,894 ..
Census,—population ..	57,244 ..	52,436 ..	21,685 ..
Average per house	6.36 ..	6.07 ..	6.56 ..
Average per supply	6.19 ..	6.03 ..	6.5 ..

A second return gave the population of the following towns, with the daily consumption of

water in gallons per head, the figures being taken from "The Case" of the London County Council in Parliament, Session 1891: the Kent Company's figures are added for comparison:—

	Total.	Domestic.	Trade.
Manchester	21	13	8
Glasgow	60	—	—
Bradford	31.0	18.30	20
Sheffield	21	14	7
Leeds	30	—	—
Oldham	29	—	—
Huddersfield	22	—	—
Cardiff	20	—	—
Bolton	30	—	—
Hullfax	22	19	15-17
Blackburn	27	—	—
Northampton	14	—	—
Birmingham	23	15	8
Kent Company's area	30	24	6

The next return showed the average daily consumption per supply and per head for all purposes, by 11,832 supplies, in fifteen of the Company's districts as registered by Deacon's meters on first readings, and for the five years 1887-91. The first readings and annual averages are as follow:—

First readings.	188-9	1887	1888	1889	1890	1891	5 years' average
.....	185.9	121.1	117.2	118.7	130.0	136.1	125.6
.....	27.6	30.1	19.5	19.7	21.5	22.6	20.9

Mr. Dickson explained that the Company's returns did not harmonise with the Census, because in Pimstead there were a number of houses not supplied by the Company, and others bisected by a parochial boundary, so that the enumerators had to arrange in what parish they should be included. The return as to the consumption per supply and per head supported the opinion he had expressed previously as to the saving effected by methodical supervision. In the two latter years the increase was accounted for by the frost. With effectual supervision constant supply appeared to be rather more economical than intermittent supply; but with the latter there was no similar supervision. The first readings were taken after the constant supply was given, and before the methodical supervision was put in operation. The other figures represented the averages of several readings, and did not give a continuous record of everyday consumption.

Dr. Ogley: I should like clearly to understand why it is that the frost increases so largely the amount of water consumed?—Witness: It is in consequence of broken pipes and the practice of opening taps to allow water to run continuously, so as to prevent water freezing in the pipes.

Mr. E. Collins, of the New River Company, handed in and explained an approximate statement of the quantities and proportions of water supplied for trade and other non-domestic purposes. The total is 3,109,000,000 gallons, or 25.79 per cent. of the total supply. Of this, 19.94 per cent. is supplied by meter for trade and street watering, 87 per cent. is the estimated supply for road-water, sewer-flushing, and other municipal purposes, and 4.98 per cent. is made up of sundry unmeasured supplies for steam and gas engines, horses, carriages, laundries, cab-ranks, &c.

Mr. James Searle, of the New River Company, responding to a question put to him when he was previously under examination, produced a return showing the net increase in the number of supplies in eight periods of five years, each from 1851 to 1891. The figures were as follows:—

Year.	Supplies.	Increase in five years.	Equal to an average increase of.
1851	88,000	—	—
1856	103,296	15,296	3,059
1861	109,978	6,682	1,336
1866	112,964	2,986	597
1871	119,012	6,078	1,215
1876	124,476	9,434	1,687
1881	133,997	9,521	1,904
1886	147,395	13,398	2,681
1891	154,568	7,313	1,462
	66,568	1,664	

He could not account for the enormous difference,—five times,—between the first period and the third. Street improvements and railway extensions in inner London might have made part of the difference, but the company's books did not furnish any definite information. Mr. Mansergh remarked "It is a most extraordinary thing," and Sir G. Bruce observed that there seemed to have been an increase of about 75 per cent. in 40 years.

Mr. Francis produced returns (1) of the population of those portions of the watershed of the

Lea and its tributaries that discharge above the Company's intake at the new gauge, Hertford, and (2) of the town of Luton, included in the totals. The figures, as far as available, were:—

	1.	2.
1861	66,172	15,329
1871	71,447	17,317
1881	76,601	23,960
1891	—	30,065

The table, it was remarked, indicated that the urban population was increasing more rapidly relatively than the rural population, and that the increase was mainly in the town of Luton.

We have now, as mentioned at the outset, brought our report down to the time of the adjournment over the holidays. The Commission will sit again early in October.

Illustrations.

THE BOURSE DU TRAVAIL, PARIS.

THE new "Bourse du Travail," opened in May last, and which formed the object of one of the visits of the Congress of French architects in June, replaces a provisional building erected in the Rue Jean Jacques Rousseau. The facade of which we give a view, at the angle of the Rue du Chateau d'En and Boulevard Magenta, is thirty-six metres in length. The external aspect of the building is dignified, though it is very soberly treated.

The building is composed of four blocks surrounding a courtyard. The central hall, preceded by a large vestibule, has been planned to serve also as a room for public meetings. The platform, reserved for the managers, occupies a semi-circular apse decorated by M. Delmotte with paintings coloured and treated somewhat after the manner of tapestry, and symbolising various Parisian trades, the arms of which form also a part of the decoration all round the hall. Above is a large glass ceiling, the metal framework of which is independent of the walls, and which can be raised or lowered without disturbing the main building. Smaller halls surround the central one, from which they are separated by movable partitions. In this way, in the case of a workmen's congress, a very large space can be obtained for meetings. The floor of the hall is formed of glass blocks which give light to an immense basement-hall, 5 metres high, a waiting place for workmen waiting for hire; a heating apparatus enables it to be also used as a shelter in winter; the floor is paved with terra-cotta blocks. The greatest care has been taken with the ventilation of every part. The whole is lighted by electricity.

The first floor is occupied by the administration, the library, and the lecture hall. The second, third, fourth, and fifth stories contain committee-rooms and 132 offices to be used by different Parisian syndicates. The furnishing of all these rooms is comfortable but very simple.

The works were commenced in November 1888 and terminated early in the present year. The ground has been purchased by the City at a cost of 110,000 f.; the architect's estimate was 1,920,000 f., including interior finish, warming, ventilation, and lighting (the latter by electricity). The accounts for the work are not fully made up, but it is expected that the actual cost will fall short of the estimate.

The architect was M. Bonvard, who has shown a great deal of ability and thoughtfulness in the successful treatment of a building which presented rather a novel problem.

NEW LIBRARY, UPPINGHAM SCHOOL.

THIS is the exterior of the building of the interior of which we gave a view in the *Builder* of September 5, 1891. It is in reality the old school house (now superseded by new buildings) altered and partially rebuilt under the direction of Mr. T. G. Jackson, A.R.A., as described in the account of the building which accompanied the view of the interior published on the date mentioned.

BAS-RELIEF OF THE CONSTABLE OLIVIER DE CLISSON.

THE life-size equestrian bas-relief representing this celebrated official of old France, whose

name is well known to readers of *Froissart*, is the work of M. Frémiot, the eminent sculptor who has recently been elected a member of the Académie des Beaux Arts in the place of the late M. Bonassieux (see "Letter from Paris" in our last issue).

The work was commissioned by the Prince de Léon, and is, we believe, to be erected in the small town of Clisson, in lower Loire. It occupied a prominent place among the sculpture exhibits of this year's Salon.

SAUNDBY CHURCH.

THE Church of St. Martin, Saundby, near Gainsborough, of which we give a view, was reopened in February by the Bishop of Southwell, after restoration, the entire cost being borne by the Rev. Charles Hudson, a former Rector of Saundby. The recent work has been exclusively to the nave. The north and south walls were both out of the perpendicular to the extent of nearly a foot; these were underpinned, cut through at the base, and brought over to the vertical without mishap. A new aisle has been added, and the ancient nave arcade opened out. The masonry has been carried out by Mr. H. Cliphamp, of Norwell; and the oak roofs and seats of the nave and aisle and the tower screen by Messrs. T. & J. Hawley, of Penistone. Four windows, by Mr. C. E. Kempe, have been added to the six windows by him placed in the church a few years back. The architects were Messrs. W. S. Weatherley and F. E. Jones.

BRANDESBURTON CHURCH, YORKSHIRE.

THIS church, before the recent restoration was taken in hand, was in a deplorable condition; the nave arcades insecure, no drainage, "loose box" pews, flat plaster ceilings, many windows and the tower arch walled up, whitewash everywhere, and the important parishioners accommodated in the chancel. The nave and chancel have been restored and made sound, and the interior rearranged as indicated by the accompanying plans. Unfortunately, for want of funds, the work to the tower had to be postponed. Sea cobles are largely used in the walls, and these and the bell-frame are in a very bad state. The existing parapets above the heavy windows are in modern brickwork.

The new stone is from the Whitty Crag Moor quarries. Messrs. H. & W. K. Barr, of Hornsea, were the builders. The marble pavements, &c., were supplied by Messrs. Farmer & Brindley, and the heating apparatus by Mr. Wm. Porritt.

Mr. W. Samuel Weatherley, of London, is the architect.

NATIONAL ASSOCIATION OF MASTER BUILDERS OF GREAT BRITAIN.

THIS Association held its twenty-ninth half-yearly meeting at Newcastle-on-Tyne on the 23rd ult. The President, Mr. J. C. White, of Liverpool, occupied the chair, and representatives from the local associations at London, Liverpool, Birmingham, Bradford, Shrewsbury, Preston, Newcastle-on-Tyne, Newcastle and Potteries, Leicester, South Shields, Gateshead, Huddersfield, and Derby were present.

The report and accounts for the past half year were adopted.

The Association confirmed the proceedings of their Council in regard to the Form of Contract now under negotiation, as amended by the Council, and re-submitted to the Institute of Builders, through whom it is to be presented to the Royal Institute of British Architects.

The Chairman stated that evidence had been given before the Royal Commission on Labour, but that there was still more evidence to be given. He also stated what had been done relative to the Plumbers' Registration Bill.

A discussion took place as to the question of worked stone being sent from the quarries to the yards or works, and also other matters connected with the building trade.

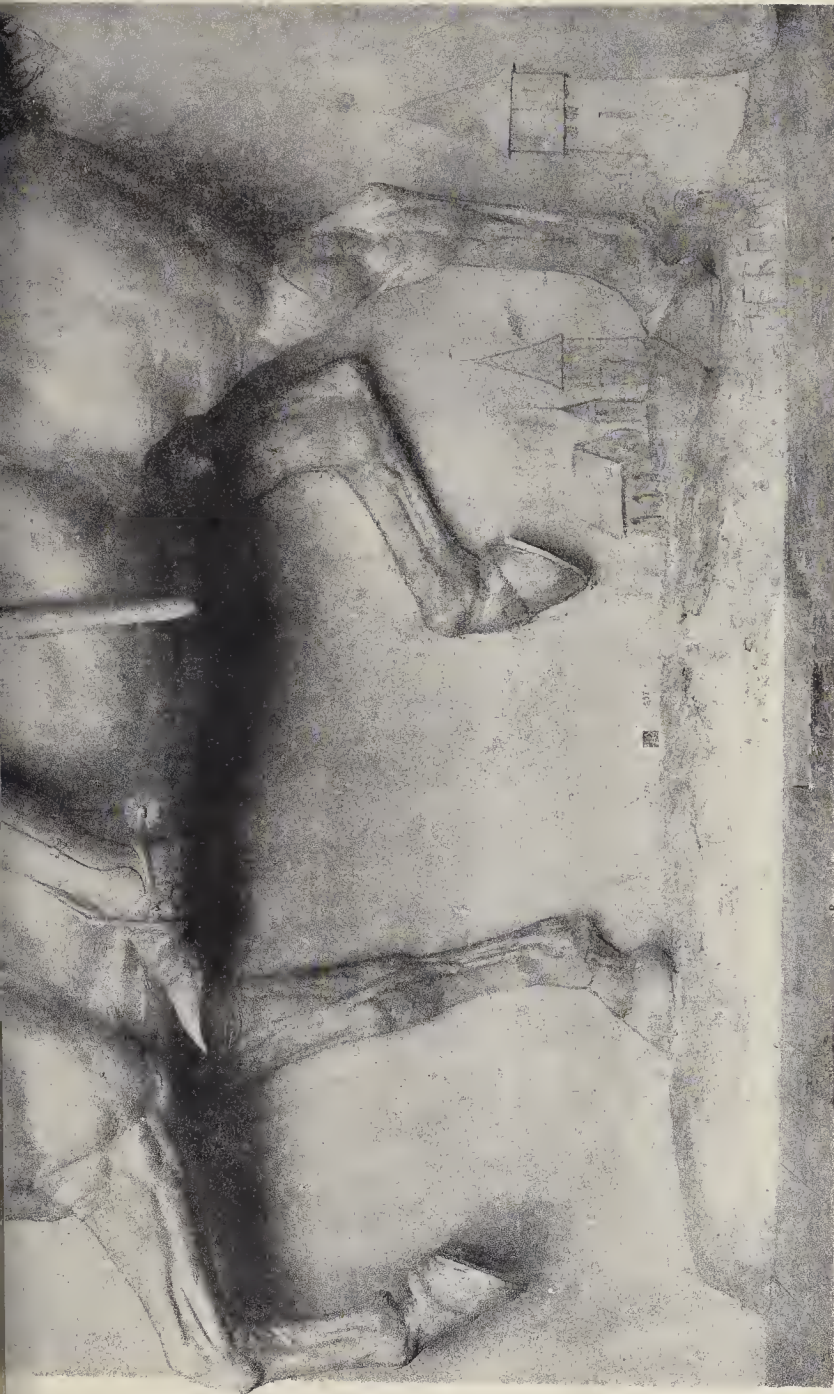
It was decided to hold the next meeting at Derby.

PROPOSED ELECTRIC LIGHTING OF OLDHAM.—On the 5th inst. Colonel Hasted held an inquiry with reference to the application of the Oldham Corporation for powers to borrow 40,000l. for electric lighting purposes. It is estimated that 21,000l. would be spent on the present works, and that the principal streets of the town would be lighted, it being stated that 2,000 lights would be used.



THE BUILDER, AUGUST 13, 1892.

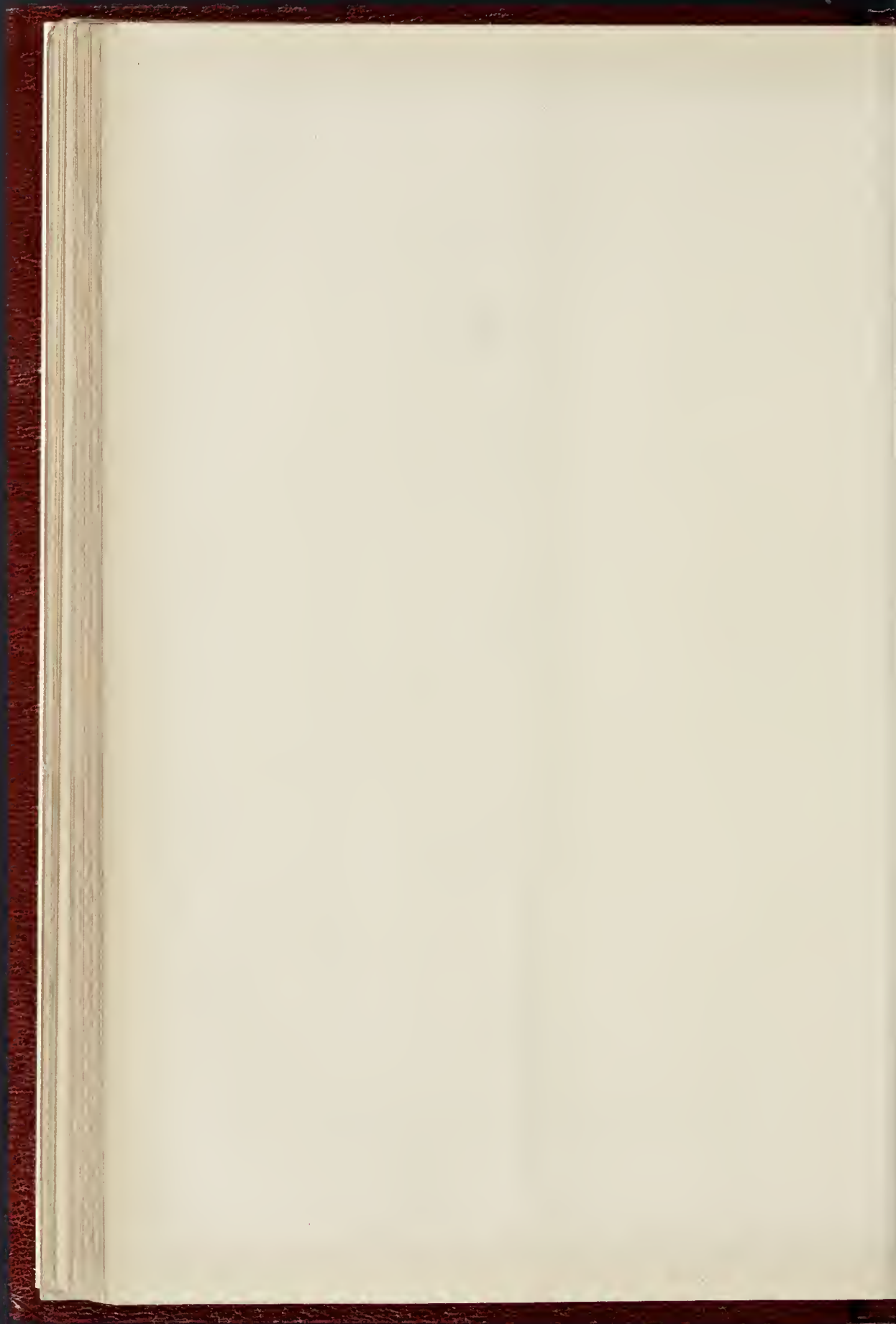




INK PHOTO SPANGLER & CO. 415 EAST HARDING STREET, PETER, U.S.A. & C.

"LE CONNÉTABLE OLIVIER DE CLISSON."—M. FRÉMIET, SCULPTOR.

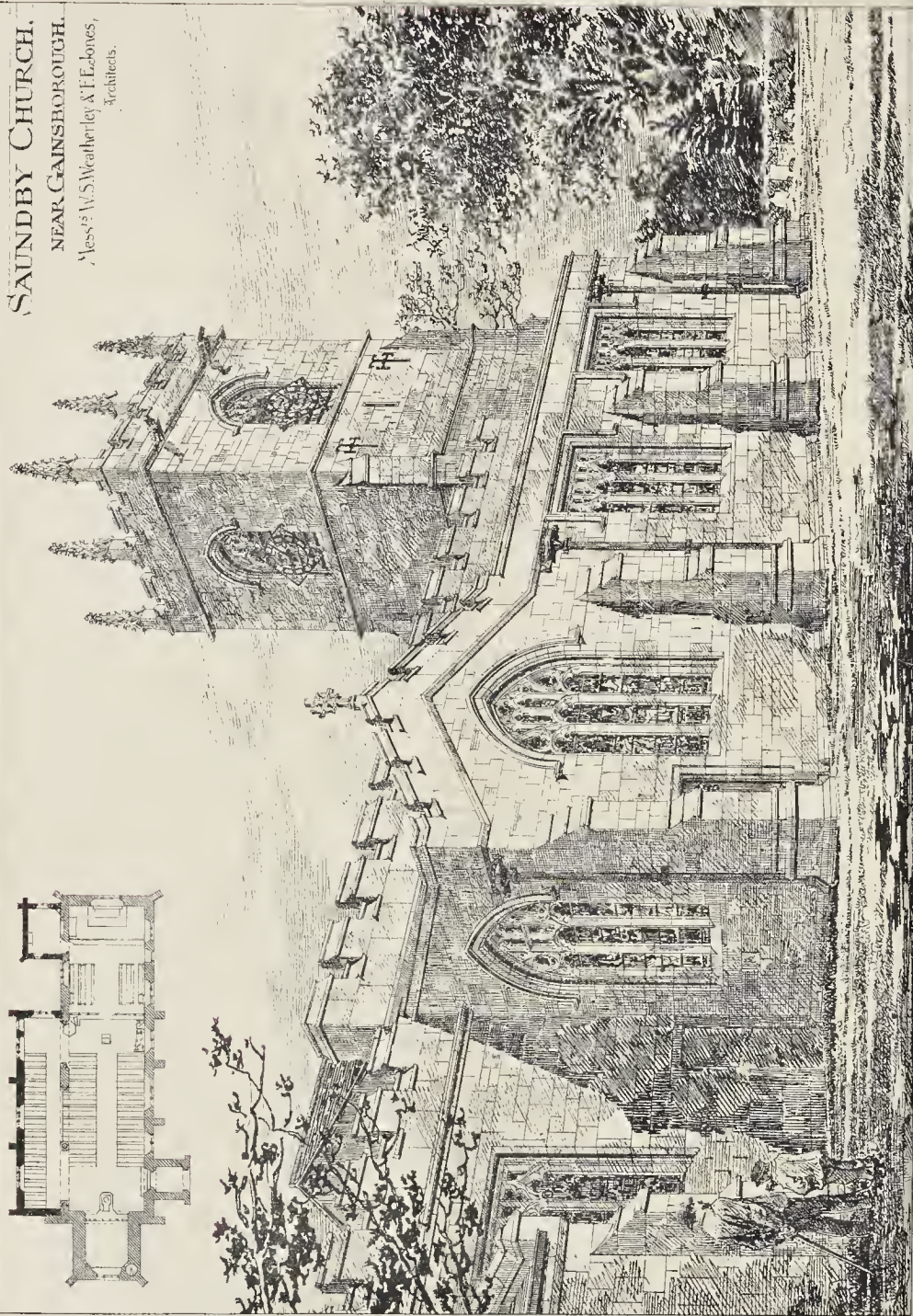
Paris Salon, 1892.

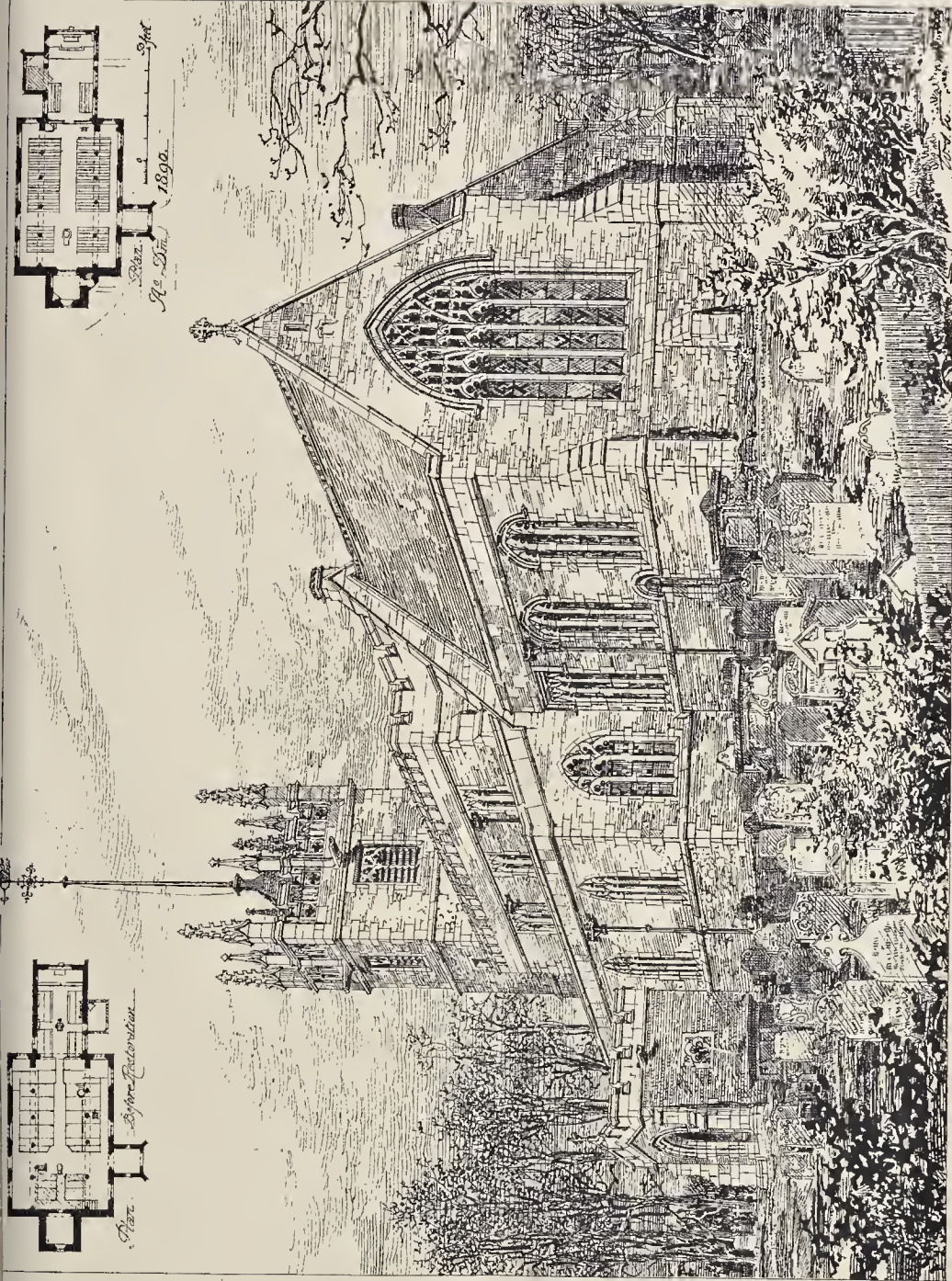




THE BUILDER, AUGUST 13, 1892.

SAUNDBY CHURCH.
NEAR, GAINSBOROUGH.
Messrs W. S. Weatherley & F. E. Jones,
Architects.



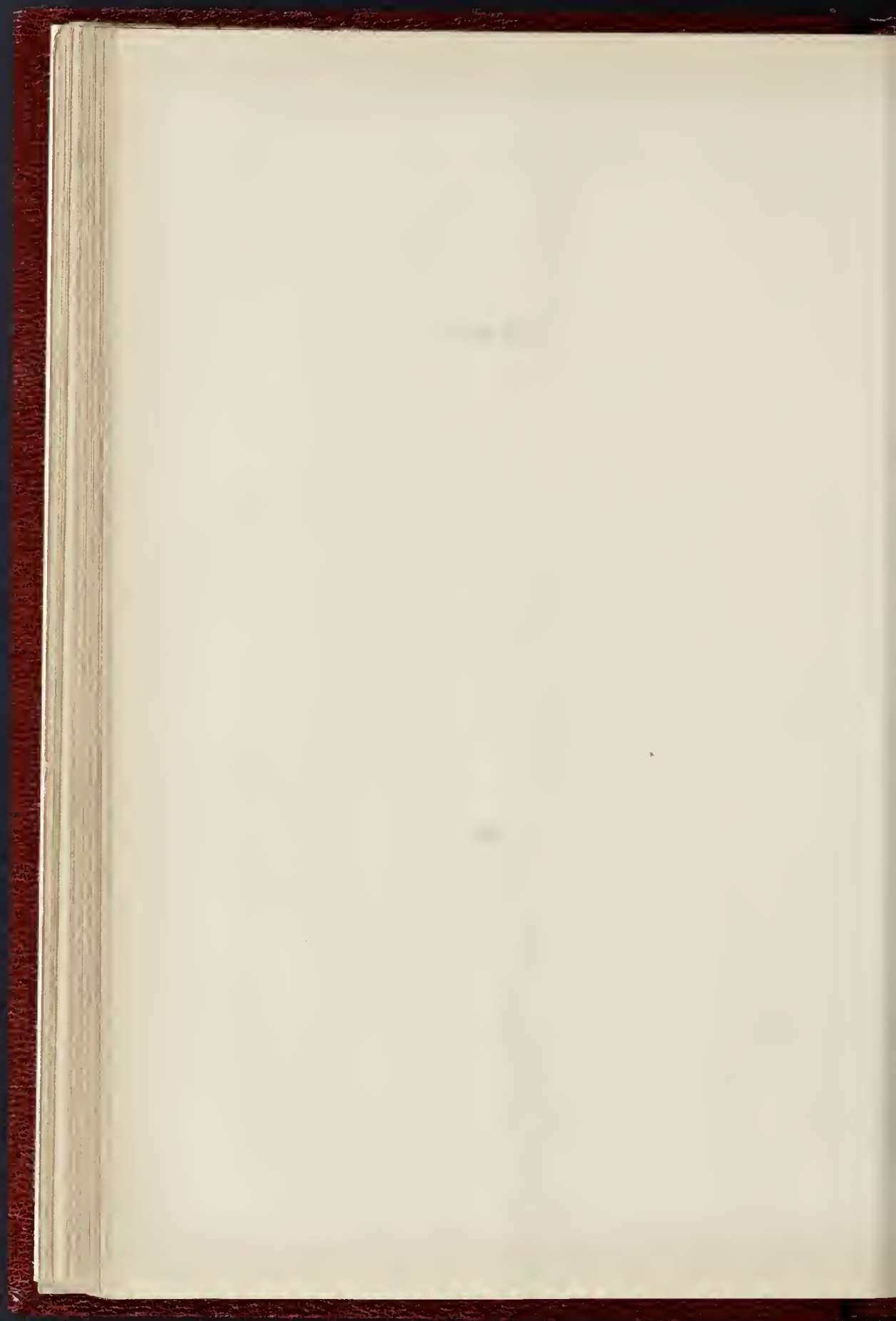


BRANDESBURTON CHURCH, YORKSHIRE.—MR W. S. WEATHERLEY, F.R.I.B.A., ARCHITECT.









INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS: ANNUAL MEETING AT BURY.

¶ We continue our report of the proceedings of this meeting (see p. 86, ante).

Street Tramways and Electric Traction.

At the afternoon meeting, on the 21st ult., Mr. J. H. Cox, M.Inst.C.E. (Bradford), read a paper on "Street Tramways and Electric Traction." After giving a brief historical sketch of the introduction of tramways in England, and described the rails, plant, and different methods of traction hitherto employed, the author of the paper said:—

Electric traction, as you know, has made wonderful strides since Dr. Siemens laid the first electric tramway at Berlin. Only one decade has passed since then, and now upwards of 3,000 miles of lines are worked by electricity in America alone. Our American cousins appear to live and move at a high pressure rate, and do not stick at forming a network of wires over their streets, so long as it facilitates locomotion; but in Europe we proceed more cautiously, and there is little doubt that these objectionable overhead wires have considerably interfered with the progress of electric traction on this side of the Atlantic.

With electricity as a motive power, we have the choice of the proverbial three courses First, to work by means of storage batteries placed under the car seats, as at Birmingham; secondly, by the underground system; and, thirdly, by overhead conductors.

As to the first, or storage system, we have a splendid example at Birmingham, which, by the courtesy of the chief engineer, Mr. Dickinson, I had the pleasure of inspecting some eighteen months ago, soon after its opening. To my mind it is an ideal system, and I sincerely hope it may some day supersede both the underground and overhead methods; but, unfortunately, there is at present little hope of such a consummation—at any rate, on gradients such as exist in Bradford.

On level routes it is a system even now well worthy of consideration, and although it may be more costly to work than the overhead and conduit systems, yet it has many advantages over its rivals,—such as the cars being able to run quite independently of each other, and independently of either overhead or underground wires, thus freeing the streets of many objectionable obstructions.

It has many other advantages that I need scarcely recount to a meeting like this,—not the least of which is its freedom from one serious drawback of the direct system, viz., where a breakdown of the principal machinery at the power station causes a temporary stoppage of the entire system.

Unfortunately, there are some disadvantages, the two most serious being the great weight of the batteries, which, at Birmingham, on a comparatively level line, amounts to 4,800 lb. or 2 tons and 13 cwt.; this, added to the weight of car and motor, making 8½ tons for a car carrying fifty passengers.

Another serious disadvantage is the deterioration of the batteries; and although some progress has been made within the last year or two in making the plates more durable and reducing the weight, there is still much room for improvement.

It is therefore necessary to turn to the direct system, where we have the choice of two methods,—the underground or conduit system, or that of overhead wires.

It is true there are several ingenious contrivances which may be included under the head of surface methods with electro-magnets attached to the car, but they have scarcely yet passed the experimental stage, and at present are certainly not practicable for hill-climbing.

The underground system, which has been for six years in operation at Blackpool, has proved fairly successful, in spite of the difficulty caused by the sand blowing into the conduit from the shore, and occasional flooding by sea-water during storms, and by exceptionally high tides.

In America this system has made very little progress, partly because of its extra cost, but mainly on account of the difficulty in preventing the conduit becoming filled with mud and water. This rather points to imperfect sewerage systems, and should not apply to a well-drained town, where frequent connexions would be made between the conduit and main sewer. An inland town would, of course, be free from sea-water and sand, and so long as the main sewers

do not become overcharged during thunderstorms and heavy rains, I see no great reason why the conduit arrangement should not answer. Like the other systems, it is not free from disadvantages, but no doubt its large additional first cost, and the drainage difficulty, have been the chief factors in preventing its adoption to a greater extent in America.

Finally, we come to the overhead system. On this side of the Atlantic there is no doubt a prejudice,—or, to put it more mildly, a very strong objection,—against allowing posts and wires to be erected in and over our streets; not only on account of disfigurement and obstruction, but also from fear of accident. On the latter score there is evidently little ground for misgiving, seeing that no fatal, or even serious, accident has occurred yet. As regards the disfigurement of the streets caused by the posts, no doubt it is possible to reduce the objection to some extent by using suitable ornamental iron posts; but as obstructions they will, I fear, be more apparent in our streets than in some Continental cities, where they are to a great extent hidden by the long avenues of trees which line the edges of the footwalks. In many such cases the poles support lamps for lighting the road by electricity. Personally, I should welcome either the conduit or overhead systems, if they would deliver us from steam haulage.

With a view of obtaining information as to the cost and capabilities of electricity in propelling tramcars on steep gradients, the Bradford Corporation recently entered into an arrangement with Mr. Holroyd Smith, acting with Messrs. Easton and Anderson, whereby those gentlemen undertook to construct an electric car, and to make trial runs for a few weeks on the Bradford tramways in Cheapside and Manor-row, between Forster-square and the Grammar School; the Corporation supplying the current required during the experiment from the electric lighting station, by means of overhead conductors, at a pressure of 300 volts.

The length of the trial run is 660 yards, commencing with a tolerably level inclination of 1 in 340 for 100 yards, then curving into Cheapside on a gradient of 1 in 13-22, with a radius of 64 ft. 6 in., followed by a straight inclination of 1 in 14-75 for 193 yards, 1 in 20 for 137 yards, and terminating at the end of a comparatively level gradient of 1 in 104 for 160 yards. The total rise is 70½ ft., or an average inclination of 1 in 28.

The Wakefield-road route is even steeper than this, having a total rise of 352 ft. from the Town-hall to Rooley-lane, a distance of 2,830 yards, or an average of 1 in 24.

The experimental running began on May 16 and terminated on June 9. The car only ran on 13 days, and made 204 return journeys, or a total mileage, including the triangle at Forster-square, of 157½.

Average time per journey up, 3-79 minutes = 6 miles per hour.

Average time per journey down, 3-73 minutes = 6 miles per hour.

Quickest journey up, when motors were worked in parallel, 2-00 minutes = 11 miles per hour.

Slowest journey up, 5-00 minutes = 4½ miles per hour.

Total measurement of electricity used during the 13 days' run, 240 Board of Trade units.

Average per mile run, 1-52 unit, say 1½.

Therefore, taking an average throughout the entire trial, the car required for its propulsion, 2 E.H.P. hours per mile run.

Cost per mile run for electricity, assuming the price to be 2½d. per Board of Trade unit, 3-81 pence.

The price of 2½d. has been fixed by the Gas and Electricity Committee of the Bradford Corporation, and I am of opinion that they could afford to supply the current at 2d. per unit, a price which would not only pay for the generation of the electricity, but leave a sufficient margin to cover establishment and other charges. I may mention that only last week a private firm of engineers, having their works situate about half-way on the Wakefield-road route, offered to supply the current at 2d. per Board of Trade unit.

It may be as well to explain briefly for the benefit of those members who have not given much attention to electrical matters, that a Board of Trade unit is equal to 1,000 watts, or one kilowatt supplied for one hour.

This has been fixed by Act of Parliament as the unit of sale of electrical energy, and is based on the international system of electrical

measurements universally adopted throughout the world.

Electrical energy consists of the product of two factors,—the current measured in amperes, and the electrical pressure measured in volts.

Briefly, then, the number of volts multiplied by the number of amperes will give the watts, and the watts divided by 746 will give the H.P.

A Board of Trade unit being equal to 1,000 watts supplied for one hour, is also equal to about 1½ H.P.

The number of passengers carried up, 1,321, or 6·4 persons per journey. Passengers carried down, 912, or 4·5 persons per journey. Greatest number of passengers carried up on one journey, 44. Greatest number of passengers carried down on one journey, 38. The driver and conductor are not included in the above figures.

The car has been stopped and started again on the steepest gradients without difficulty, even when fully loaded with passengers, and has taken the curve at the bottom of Cheapside without any preliminary rns.

The E.M.F. has only varied very slightly from about 280 to 300 volts.

On several of the ascending journeys the voltmeter and ammeter carried in the car gave the following readings, at various places on the route, viz.:—

	Volts.	Amperes.	Gradient.	
Opposite the end of Market-street 294	40	= 15·76 E.H.P.	1 in 170	
Rounding curve into Cheapside.. 280	60	= 22·52 "	1 in 13-22	
Half-way up Cheapside..... 281	56	= 21·09 "	1 in 14-75	
Opposite Salem-street	281	34	= 12·90 "	1 in 85

On the descending journey—

Opposite Savings Bank	294	24	= 9·45 "	1 in 104
Rounding triangle, Forster-square.. 300	15	= 6·03 "	level	

The momentary current required to start the car on the steep gradient in Cheapside was about 100 amperes.

The car will seat 36 passengers, 18 in and 18 out, and weighs 2 tons 9 cwt. 2 qrs. The motor-truck and motors weigh 3 tons 19 cwt. 2 qrs., total, say, 6½ tons; when fully loaded with passengers, the total weight may be taken at 8½ tons.

Dual armature motors of 15 h.p. each transmit motion to the wheels by means of worm gearing, and the worm wheels are so attached that each car wheel is separately driven, each axle having only one wheel keyed upon it, the other being keyed upon a loose sleeve conjointly with a worm wheel.

The electricity is controlled by three switches at each end of the car, one a main supply or emergency switch, one a regulating switch acting upon resistance coils, and one a setting switch whereby the two dual armature motors may be set to work in series

During the trial some hitches occurred from various causes, occasioning delay; but nothing really serious happened to raise much doubt as to the ultimate success of the experiment.

The motors at first produced a slight hissing sound, but this was soon remedied, and the running of the motors and gearing afterwards was practically noiseless.

An electric brake is available, so arranged that when the car is running down-hill by gravitation alone it drives the motors, and they can be instantly set to act as dynamos, generating a current that tends to drive them in a reverse direction, and so stops the car.

Although a few mishaps occurred, as above stated, it has been clearly shown that the motors are amply powerful to work steep gradients. The car runs very smoothly, without making much noise or nuisance of any kind, and causes considerably less damage to the permanent way than the heavy steam engines and cars at present in use.

The net results, then, of the recent experiments in electric traction at Bradford show that cars worked by electricity can be made to mount any gradient which can be climbed by a steam-engine, and quite as cheaply, providing there is a tolerably quick service and plenty of traffic; that the energy required to ascend and descend such gradients as I have mentioned is 1½ Board of Trade unit per mile, and assuming the price of the electricity to be 2d. per unit, it follows that the cost of running up and down such gradients is 3d. per car mile.

As the primary object of the experiment was to ascertain the desirability or otherwise of adopting electricity for working the projected

steep line in Wakefield-road, perhaps I may be permitted to state as briefly as possible the conclusions which I arrived at.

The length of the proposed tramway route for Wakefield-road is 2½ miles. The carriage-way at present is not sufficiently wide to admit of the construction of a double line, and, if specially widened for the purpose, it would involve the narrowing of the footways to the extent of about 2 ft. on each side of the road, at an expenditure of 1,600*l.*

A double line of ordinary tramway would cost 4,500*l.* more than a single line with passing-places, besides an additional cost of 3,150*l.* for a double underground conduit.

There are also other advantages in favour of a single line, viz., there is less interference with the roadway and ordinary traffic, less length of line to maintain, less rental for the lessees to pay, and experience has proved that the wear of a single line is very little, if any, more than that of a double line. This may appear somewhat strange, seeing that there is twice the amount of traffic passing over the single portions of the line that passes over the double portions; but the joints of a tramway are always the weakest places, and on a double line the heavy engines and cars are constantly travelling in one direction, which tends to beat or hammer down the leading end of each rail, thus causing serious damage both to the rail, fish-plates, and concrete foundation at each joint, whereas on the single line the traffic passing in both directions compensates matters by pressing equally on both rail ends.

Formerly there was some difficulty experienced in working a single line and passing-places with the electric and cable systems of traction, but such improvements have been made in the points and crossings, that no serious difficulty need be apprehended in this respect.

Owing to such a small car mileage as would be attained with the present limited passenger demand, the expenses work out exceedingly high, and it is quite hopeless to expect electric traction paying on a short isolated line like Wakefield-road, unless a much quicker service can be maintained with at least double the above number of car miles annually.

The working expenses, which I estimate at 10*l.* 3*s.* per car mile run, exclusive of rental,* would decrease rapidly in proportion to the number of miles run.

For instance, for another line in Bradford, viz., Manchester Road Tramway, having a yearly car mileage of 175,000, the rate for working expenses and rent would probably be reduced to 9*d.*

Again, the receipts on this line are very high, viz., about 1*l.* 6*d.* per mile run, whereas on the Wakefield-road line, they cannot safely be estimated to reach more than 1*l.* 0*s.* 10*d.* per car mile.

It is therefore certain that electric traction cannot be adopted for the Wakefield-road line, so as to be self-supporting, the loss in case of an electric tramway, with overhead conductor, being 400*l.* per annum, irrespective of the interest on the capital sum of 8,900*l.*, which would have to be spent by the lessees on the equipment of the line.

This latter sum taken at 5 per cent. would therefore make the total loss 845*l.* per annum.

The loss upon an electric tramway with underground conductor would be still more, owing to the greater first cost of the line. The deficit in this case is estimated at 682*l.*, which, added to the interest at 5 per cent. on the sum of 8,900*l.* for equipment, gives a total loss per annum of 1,127*l.*

Seeing that two tramway companies already exist in the town, both employing steam as a motive power, the most economical course would undoubtedly be to let the line, if possible, to one of them, as the capital charges and working expenses would be considerably reduced in their case, than if leased to a new company or promoters.

The question I have therefore put to the Corporation is: Will they adopt steam traction for the Wakefield-road section, for the unexpired portion of the lease which has now nearly eleven years to run; in the meantime gaining experience by observing the results of electric traction in other places? or, will they subsidise the tramway to the extent of the loss

mentioned, and try electric traction for the remainder of the lease, and thus obtain reliable data, which may enable them to decide as to the motive power to be used on all the Corporation tramways, when the existing leases have expired in 1903?

In the discussion which followed,

Mr. J. Lohley (Hanley) proposed a vote of thanks to the author for his paper, which, he remarked, had come at a very opportune moment in the history of tramway work; and they owed a deep debt of gratitude to the Bradford Corporation for having led the way as it had done in the matter of electric lighting as well as of electric traction. He, personally, like Mr. Cox, would welcome either the conduit or the overhead system if it would relieve the streets from steam traction. Those engineers who had experience of steam haulage in the streets knew the great annoyance and difficulties connected with it. As to electric traction, he thought too much objection had been made to the overhead system of electric conductors. He had recently travelled over many miles of electric tramways in America, and the advantages of the system were so great that there was little fear of anything else taking its place. He had seen tramcars worked most successfully on this system at Boston, Newport, Rhode Island, and Lynn. With regard to the supposed ugliness of overhead wires, he admitted he was prejudiced against them until he saw them in America, but he had not been in Boston twenty-four hours before he had ceased to notice them, and he thought it would be the same here. With single-line tramways, as was the case in many English towns, the advantages were very great indeed.

Mr. J. T. Eays (West Bromwich) formally seconded the vote of thanks.

Mr. Escott (Halifax) asked if there was any intention of introducing the system described into Bradford. He criticised the hissing sound from the cars, and also expressed his belief that the tops of the cars would be unsafe for passengers, as if any one touched the wire, either with their umbrella or hand, it might be instant death. He further compared the poles and wires to lines to dry clothes upon, and hoped such a system would never be adopted in any town with which he was connected.

Mr. Eachus (Edmonton) commended the courageous conclusion arrived at by Mr. Cox, that the Corporation of Bradford would have to put their hands into their pockets to support the system.

Mr. G. F. Deacon (Liverpool) said he had previously the greatest possible objection to the overhead system, but having seen it at work in Florence, one of the most picturesque cities in Italy, he confessed that at first sight he should not have noticed the wires. The way in which they were hung was not obtrusive, and the control over the cars was perfect. This system of electric traction was not only cheaper in the first cost, but also in maintenance. The hissing sound complained of could be overcome by attention to the commutators.

Mr. R. Godfrey (King's Norton) said he had had to watch the storage system for eighteen months in his district, and he was sorry to say it was not so great a success as it was thought to be. One of the chief causes of complaint was the offensive smell of sulphuric acid in the cars, and its disastrous effect upon the clothing of passengers.

Mr. W. Jones (Colwyn Bay) said that from an experience of six years at Blackpool he favoured the conduit system of electric traction.

The President, in closing the discussion, expressed his thanks to Mr. Cox for having given the Association so practical a paper.

Mr. Cox, in reply, said the question whether the Corporation of Bradford would adopt this system was still undecided. Of course, the great loss that was foreshadowed in his report made them hesitate. The supposed danger of fatal accidents resulting from passengers coming in contact with the wires could be set aside at once, because, although there were 3,000 miles of tramway worked with electricity in America, there had not been a single fatal accident, and they worked at a much higher voltage there than we did in this country. The hissing sound undoubtedly was caused by the commutators, but that had been remedied, and he did not think much attention need be paid to it. He had heard the same objection as Mr. Godfrey

as to the smell of acid, and he had no doubt there was something in it.

The members subsequently visited and inspected some wood pavement work in course of progress, and then drove in brakes (provided by the Corporation of Bury) to the Irwell Forge, where they saw some interesting manipulations of heavy rollers. Then they went to the Lowercroft Bleach Works, one of the large establishments engaged in the bleaching of finished cotton and mulesin goods; and then to the railway siding in course of construction to connect the Corporation Gas Works with the Lancashire and Yorkshire Railway, and they held their annual dinner in the evening.

We hope to conclude our report of the meeting next week.

The Students' Column.

CONCRETE.—VII.

ARTIFICIAL CEMENTS (continued).

II.—PORTLAND CEMENT.

UNDoubtedly the most valuable matrix for concrete is Portland cement. Strength for strength it is cheaper than lime. By its aid works have been executed which seem able to withstand for ages the rough usage of stormy seas and the insidious attacks of the atmosphere. It is first mentioned in a patent granted to Joseph Aspdin, a bricklayer of Leeds, in 1824. That is nearly thirty years after the introduction of Roman cement by Parker. The name "Portland" was given to it in consequence of a resemblance of its colour to that of Portland stone. Aspdin's cement was a mixture of pulverised quick-lime and clay, but neither the mode of manufacture nor the nature of the cement is identical with modern practice. In 1825 he established a manufactory at Wakefield, in Yorkshire, and in a few years his son William, in partnership with one or two other persons, began to make Portland cement at Northfleet, on the Thames. Mr. I. C. Johnson is of opinion that he himself was the first maker of true Portland cement; in 1841 he introduced its manufacture into the works of Messrs. J. B. White & Co. However this may be, there is no doubt that, soon after this time, Portland cement began to be better appreciated. Its value was ascertained by actual use and by numerous tests, such as those carried out by Mr. John Grant, from 1859 almost to the present time, and to-day it is employed for engineering works the world over. It has been estimated by an American writer, Mr. Giron, that the present annual production of Portland cement is more than 20,000,000 barrels, and that of these about 8,300,000 barrels are made in England. To engineers chiefly we must look for information respecting this material, and to them architects and builders owe a debt of gratitude.

Composition.—The raw materials from which Portland cement is manufactured vary to a considerable extent. On the Thames and Medway, chalk and river-mud or clay are the constituents; while at Rugby, Stockton, &c., in Warwickshire, at Poole in Dorset, and at various places in Somerset, Nottinghamshire, Lincolnshire, &c., lime-lime limestone is used instead of chalk. The aim of the manufacturer is to obtain a mixture of clay and lime in which the carbonate of lime before calcination shall be from 75 to 77 per cent. of the whole. When chalk, which is nearly pure carbonate of lime, is used, it is comparatively easy to obtain the requisite proportion of lime to clay, but when a limestone consisting partly of clay and partly of carbonate of lime, as lias limestone does, is used, more difficulty is experienced, for the composition of limestone is subject to considerable variations. In such cases it is advisable to make frequent analyses of the stone.

An excess of clay in the composition produces a cement of less strength and weight than usual, and liable after setting to crumble away on exposure to the atmosphere; such cement, when mixed neat with water and left in the air, will have a buff colour. Over-clay compounds are liable to fuse in burning, and, as this would render the clinker useless for cement purposes, they are burnt at lower temperatures, and produce cements which partake somewhat of the character of Roman cements. An excess of lime has also disadvantages, for it may produce a cement containing more or less caustic lime, and having therefore a ten-

* Conduit system, rental 3*s.* 11*d.* per car mile additional, viz., 1*d.*. Overhead system, rental 2*s.* 6*d.* per car mile additional, viz., 13*d.*

dency to crack or "blow" when made into mortar or concrete; this danger may be lessened by burning the clinker at a high temperature, by grinding the cement very fine, and by properly purging or air-slaking the cement before it is used.

Manufacture.—In making cement from chalk and clay, these materials are mixed in the proper proportions, and broken up with water in a wash-mill, which is usually a pit forming a ring around a central pier; on this pier a vertical shaft fitted with horizontal arms revolves, and from the arms knives or cutters descend almost to the bottom of the pit; other arrangements, however, are often adopted. Originally the quantity of water with which the chalk and clay were mixed was very large, being, indeed, of preponderating volume, and this necessitated the conveyance of the wet "slip" into "backs" or reservoirs, where it remained for a month or more until sufficient water had evaporated or drained away from it. Besides other disadvantages, this system entailed extensive areas of ground for "backs," and also great delay. In 1870 a new method of manufacture was patented by Goreham, the chalk and clay being mixed in the wash-mill with about one-third their volume of water, the slip thus formed being passed immediately between horizontal mill-stones, by which it was well ground; from the mill-stones the slip was conveyed (by pumps or otherwise) direct to the drying-floors, instead of to the "backs." Since that date numerous improvements have been made in the methods of cement manufacture, but of these it is not necessary for us to write in detail.

Originally the "slurry," or wet slip, was dried on floors heated by coke ovens; but to-day, in new works, the invariable custom is to utilise the waste heat from the kilns for heating the drying floors, and by this means a considerable saving is effected. From these floors the dried slip is put into the kiln and burnt at a high temperature, the object being to produce a hard, well-burnt, but not vitrified "clinker." The temperature necessary varies according to the composition of the raw cement, but may reach 2,900 deg. Fahr. It is, of course, impossible to obtain a perfectly uniform clinker; some portions of it will be over-burnt and fused together,—these, if ground, would have no cementitious value; other portions will be of a clayey hue, and decidedly under-burnt,—these would produce a dangerous cement, liable to crumble away after exposure to the atmosphere; neither of these should be used. The under-burnt portion is placed on the top of the next kiln and re-burnt. Very cheap cement will probably prove to have been ground from under-burnt clinker, as this is more easily ground than heavily burnt clinker. The latter, however, should be used, as it yields a cement considerably stronger than a lightly-burnt cement, when ground to the same degree of fineness. The properly-burnt clinker is broken into small pieces by rollers, or Blake's stone-breakers, or other machines, and these pieces are then finely ground between grooved mill-stones, which are usually about 4 ft. 6 in. in diameter. The resulting cement may, however, contain a considerable quantity of particles too coarse to be of any value; it is, therefore, by many manufacturers sifted by fine sieves, the particles remaining on the sieves being returned to the mill-stones, and ground with the next batch of broken clinker. These coarse grains, although in their coarse state they have no cementitious value, may prove, if finely ground, to be of excellent quality.

After leaving the mill-stones, the cement is spread daily in a thin layer on the floors of store-rooms or warehouses, until several layers, representing a week's manufacture or more, have been distributed one above the other. Sometimes the cement is turned over occasionally. It is then filled into sacks or casks, the different layers being as far as possible mixed in the operation. The cement is then ready for its destination, but not always for use. Of the precautions to be taken before using cement fresh from the manufacturer we shall treat in a subsequent article.

In America a novel process of cement-manufacture has been adopted; the raw compound is burnt, we are told, "in a powdered condition, while travelling in an inclined rotary furnace in an intensely hot petroleum flame, and a few hours is sufficient to finish the process." Apparently the invention is a successful one, for the cement is guaranteed to bear without breaking a tensile stress of 400 lbs. per square inch after

seven days, 500 lbs. after twenty-eight days, and 600 lbs. after three months, and to leave no more than 10 per cent. residue on a sieve with 6,400 meshes to the square inch.

Composition.—Roughly speaking, Portland cement contains about 60 per cent. of lime, 21 per cent. of silica, and 7 per cent. of alumina; the remaining constituents being the alkalies,—soda and potash,—oxide of iron, magnesia, sulphuric acid, carbonic acid, &c. To the user of cement, its detailed composition is not of primary importance; the chief points for his consideration are the strength and durability of the cement, and one cement must not be condemned because it differs slightly in composition from another of established reputation; for instance, the lime in different cements varies from, say, 56 to 63 per cent. of the whole. A wide difference, however, calls for considerable caution and careful tests. The following list of analyses has been compiled in order that a general idea of the various proportions in which the constituents of Portland cement occur may be gained by the student:—

TABLE XI.

Analyses of Portland Cements.

No. of Sample.	Lime.	Silica.	Alumina.	Oxide of Iron.	Sulphuric Acid.	Soda and Potash.	Other Ingredients, Loss, &c.	Authority.
1a	62.79	22.12	5.34	3.01	1.69	1.32	4.33	John Grant.
2b	61.76	20.54	9.09	3.94	0.71	2.13	2.92	Henry Fajia.
3	60.76	21.32	4.76	4.24	2.50	2.80	3.22	John Grant.
4	58.29	20.56	6.20	6.76	1.62	1.23	5.34	John Grant.
5c	58.20	21.70	11.15	4.85	1.30	0.85	1.95	Henry Fajia.
6	58.02	23.38	8.42	5.10	0.84	0.64	3.60	John Grant.
7	61.05	22.22	10.10	3.19	0.85	1.34	1.25	A. E. Carey.

a. Average of four samples of German Portland cement.
b. Portland cement made on the Thames.
c. Portland cement made at Stockton, near Rugby, by Messrs. Greaves, Bull, & Lakitt.

It does not appear to be very clearly understood what part each constituent of Portland cement plays in its setting. The lime and silica undoubtedly play the most important part, but the action of the rest is still somewhat obscure. Knapp, a German writer, considers that iron and alumina are only of indirect service, but that soda and potash, which combine with silicic acid to form silicates of soda and of potash, and are in that form soluble in water, act as "transferers of silicic acid to the lime." Sulphuric acid has the effect of retarding the setting, but in excess it is injurious; so injurious, indeed, is it considered in France, that any cement which contains more than 1½ per cent. of it is condemned without further testing.

Theories of Induration.—We have already seen that a considerable quantity of the water used in mixing the chalk or limestone and the clay is evaporated from the slip on the drying-floors. The remaining moisture is rapidly driven off in the kiln, and the carbonic acid gas forming part of the chalk or limestone is also quickly expelled; so far, the results of calcination are similar to those produced in the calcination of fat lime. But Portland cement slip contains clay and other ingredients, and all, or, at any rate, most, of these are affected by calcination. The reactions which take place are even now only imperfectly understood. It appears that the clay is split up into its component parts, namely, silica and alumina, at an early stage of the burning, and that the calcium oxide or quicklime, remaining after the expulsion of carbonic acid gas, combines with these to form silicates and aluminates of lime, the exact nature and value of which depend upon the proportion in which the several components of the cement-slip bear to one another, and upon the temperature at which they are burnt, and, further, upon the duration of the burning.

One of the earliest theories of the setting and hardening of cement was that of Pettenkofer, published about 1850. He considered that calcination should, at a moderate temperature, convert the calcium carbonate into calcium oxide, and at a high temperature should effect "a chemical combination of silicic acid with alumina, iron, and the alkalies, the silica being by this means protected from at once combining with the lime, but made available for future chemical action under changed conditions brought about on the addition of water." When water is added, the silicic acid is freed from the combinations effected by calcination, and combines with the hydrate of lime (into which the water has converted the calcium

oxide) to form silicate of lime; this "partially decomposes the other silicates of alumina and iron in the act of hydration, forming double hydrated silicates, which are practically insoluble."⁷⁸

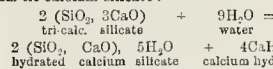
Knapp, another German writer, declares that a portion of the calcium oxide formed during calcination reacts upon the clay and converts it into a compound easily decomposed by acids. This compound and the excess of calcium oxide, when water is added, react upon each other in such a manner, he says, "that a solid stone-like silicate" is produced.

M. M. Chatonoy and Rivot inclined to the opinion that silicates of both alumina and lime are formed during calcination, and that these compounds are split up in the presence of water, the result being the formation of hydrated aluminate and silicate of lime.

Another authority,—to wit, Mr. Guthrie, Demonstrator of Chemistry at the Sydney University,—states that at a comparatively low temperature the lime is converted into silicate of lime; and that a high temperature induces the formation, in addition to this, of

aluminate of lime, and finally of a double silicate of alumina and lime. This double silicate, and also the aluminate of lime, on the addition of water form hydrated silicates and aluminates, which set by crystallising.

A French mining engineer, M. Le Chatelier, has published the conclusions at which he arrived after making numerous experiments with silica, alumina, and lime. A short account of these will be found in the *Builder* for July 6, 1889. M. Le Chatelier discovered that the only combination of silica and lime which will "set" on the addition of water is the tri-calcium silicate, i.e., SiO₂ + 3CaO; this, however, cannot be produced by simply burning these substances together, and it is therefore probable that its formation in cement-clinker is brought about by the influence of some other ingredients of the cement, perhaps iron and alumina or the alkalies. The following equation expresses the chemical changes which take place on the addition of water to this tri-calcium silicate:—

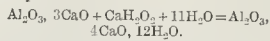


A writer in the *Engineer* for September and October, 1888, declares that the hydrated silicate of lime thus formed is dissolved by the water, which becomes super-saturated, and consequently crystallisation suddenly occurs, the lime being deposited "in extremely attenuated fibre-like prisms, . . . united by one extremity to a central point so as to form little spherulic groups." Thus the changes are "the chemical one of hydration, and the physical ones of solution, super-saturation, and crystallisation."

With reference to alumina, M. Le Chatelier discovered that several different combinations of this substance and lime "set like plaster when pulverised and mixed with water, but all decompose in excess of water, and when the excess is considerable, they may be completely dissolved." In the presence of free hydrate of lime, however, an hydrated aluminate of lime (Al₂O₃, 4 CaO, 12H₂O) may be formed, which soon crystallises in a similar manner to the hydrated silicate of lime. An examination of the equation representing the chemical changes which occur on the addition of water to the tri-calcium silicate shows that four molecules of hydrate of lime are set free on the forma-

⁷⁸ "Proceedings of the Institution of Civil Engineers," 1879-80, vol. lxxii, paper No. 1,649, by Messrs. Scott and Redgrave.

tion of the hydrated silicate of lime, and it is this hydrate of lime which, according to Le Chatelier, brings into action the tri-calcium aluminate in the cement. The result may be thus expressed:—



It is probable that the action of slag-cement may throw some light on that of Portland cement. Slag itself contains lime, silica, alumina, and other substances, in varying proportions. A slag suitable for conversion into cement may contain, say, 36 per cent. of lime, 30 per cent. of silica, and 23 per cent. of alumina. These have been converted, in the enormous heat of the blast-furnaces, into compound silicates of lime, alumina, &c., which undergo little or no change on the addition of water; they are practically inert. But when ordinary slaked lime in powder is mixed with the ground slag, a cement is formed which sets on the addition of water, and attains great strength. We know that slaked lime (calcium hydrate) does not set in water, and the ground slag itself has no hydraulic properties; it is evident, therefore, that the setting must be due to a reaction between these substances. This seems to point to Knapp's theory as the correct one, but not conclusively, for, as Mr. G. R. Redgrave has stated, it is possible that the intense heat of the blast-furnace may result in the formation of compounds quite different in their action from those formed in the lower temperature of a Portland cement kiln.

Experiments by M. Perrotti, published in the *Annales des Ponts et Chaussées*, 1884, seem to show that Portland cement which is allowed to harden in the air absorbs carbonic acid gas from the atmosphere to the extent of about 6 per cent. in the first six months, while cement immersed in water remains free from it. The briquettes, kept in water, and therefore free from carbonic acid gas, offered about twice as much resistance to compression as the others, between the ages of one and six months; but this, we may say, is an abnormal difference.

Correspondence.

To the Editor of THE BUILDER.

PROPOSED "FRESCOES" AT THE ROYAL EXCHANGE.

SIR,—With regard to the proposal of the Gresham Committee to decorate the Royal Exchange with a series of frescoes illustrating the history of the City of London, it is an excellent idea, but will it be possible to carry it out? I do not believe there are a half dozen artists in this country who understand the art of fresco painting. This, the highest art of decorative painting, has been very little practised in this country. As you are no doubt aware, Sir, fresco painting ought to stand in any climate exposed to all seasons. I am sorry to say that fresco seems to be a lost art, at least in this country. The fine paintings in our Houses of Parliament were supposed to be frescoes, but as they were rapidly perishing they were put under glass. What I mean to say is that real fresco should last as long as the building upon or in which it is employed. Now, in Italy and France you will find splendid specimens of real frescoes which have stood all weathers, and look as well as when first painted. I believe it depends a great deal upon the colours and the encaustic medium employed; the secret of making this encaustic medium being known to very few artists.

As regards the Royal Exchange, now that it is covered in, our London climate would have very little effect upon the proposed historical paintings if they were done, not as frescoes, but with the encaustic medium, and would not require cleaning for at least a period of from thirty to forty years.

HENRY H. B. SANG.

COMPOSITION OF MORTAR.

SIR,—I have been very unwell, and so passed Mr. Hughes's letter in your issue of July 30. This question of mortar has troubled me very much for some years past, and I again thank Mr. Hughes for continuing to ventilate the subject. "Clean, sharp sand" is what is wanted; the Thames Valley gravels, however, do not yield it, but are associated with the

"impalpable earthy matter" to which I alluded, and which does check crystallisation. It is not gross and palpable when the sand is separated from the gravel, but when washed the sand yields a considerable proportion of mud, and that is the earthy matter in question.

Soluble silica, such as is derived from the decay of sponges, and such as helps to make up concretionary masses of sand, would assist crystallisation, and I am not one with Mr. Hughes on that point; it is the impalpable mud which is the bane of the Thames Valley sands, and to it is due the failure of mortar in which it is incorporated.

I have experienced failure by it in use with Barrow lime (a lias). The greater part of the mortar used in London is made with grey stone lime, the lowest bed of the chalk,—that is, a carbonate of lime with alumina and a small proportion of silica (a weak hydraulic lime).

The main drainage drew off the water from the gravels of London to a certain depth, but where the water remains the operation of digging gravel and lifting it through the water washes out the mud and gives us clean, sharp sand and gravel.

T. E. KNIGHTLEY.
106, Cannon-street, E.C., Aug. 10.

THE PROPOSED NEW STREET FROM HOLBORN TO THE STRAND.

SIR,—This straight avenue as planned by the London County Council (see plan in the *Builder* for July 9, p. 35) between the two great thoroughfares is undoubtedly a great improvement on all previous suggestions.

But as an important portion of the much-desired grand avenue between North and South London, it seems to be about fifty yards too far west.

The traffic between the north and south of the City is increasing so rapidly that it is universally admitted that it will be necessary soon to provide additional facilities for crossing the river. It has been proposed to widen Waterloo Bridge. This would probably be as expensive as building a new and more appropriate bridge in a better position.

In the accompanying sketch the proposed new bridge is located at the foot of Norfolk-street, which, for many reasons, seems to be the most desirable position. If this is accepted as the best point for the new bridge, a straight avenue similar to the one suggested by the Council would carry us up Norfolk-street,—widening same on the west side,—crossing the Strand, and from thence to the much-debated point of the west side of Lincoln's Inn-fields.

It is hard to endure the pricks of conscience one suffers in even suggesting the disturbance of a quiet repose of this lovely spot, resting as it does so peacefully in the very midst of such bustle and confusion.

But we must console ourselves with the belief that the rising generation will consider themselves more than compensated by the better facilities proposed for reaching the Strand, the Highgate on Harrow, or on the beautiful hills of Surrey and Kent. And now if we can get our legal brethren sufficiently quieted down to allow this beautiful and most useful avenue to pass by their doors, we would then extend it straight to Holborn, but about fifty yards east of Southampton-row.

Careful study will probably show that it would not be best to remove the block of buildings between Southampton-row and Kingsgate-street, as that would be very expensive property; but that it would be both cheaper and better to extend the new avenue directly north to the west side of Red Lion-square. Here the first and central section might terminate. This portion from the Strand to Red Lion-square could be constructed at once, and form a completed whole to the great advantage of that neighbourhood.

But I believe it would soon be found desirable to extend this grand avenue north at least as far as Euston and St. Pancras stations. I believe it will be found most advantageous to construct an entirely new avenue for this section, and not disturb Southampton-row in any way. This street ought to be kept most scrupulously for a first-class carriage drive, and no trams or objectionable heavy traffic allowed upon it. It might be possible to make this one of the most fashionable carriage streets in London lined with correspondingly handsome shops.

Before the avenue was completed to Euston-road, with light spurs to St. Pancras and Euston stations, the thoughtful engineer would see the great advantage of extending this grand avenue to Camden Town station on the North London Railway.

It is quite possible this may be found a very advantageous position for a great union station. It can be made easily accessible from all the great trunk lines from the north and east, and consequently, a very good point for collecting and distributing long-distance passengers.

It is also the centre of a number of important avenues, which communicate with Hampstead,

Highgate, and the east, which makes it a very important point for local and surface traffic.

Unfortunately, Euston-road is at the present time practically the limit of the city to the north. The great railway corporations are taking almost entire possession of the whole territory immediately north of this line. But the city authorities ought to struggle earnestly with these powerful companies to induce them to allow her to retain a decent and agreeable communication between her beautiful northern suburbs of Highgate and Hampstead and the centre of the city.

The chances for preserving such communication are rapidly diminishing.

By extending the grand avenue to Camden Town as suggested, the fashionable limits of the city could be carried so far, and you would be then delivered beyond the most disagreeable portions of the great freight-yards and cattle-pens; and from this point it would be quite practicable to construct handsome avenues connecting with the very desirable residential neighbourhoods of Hampstead, Highgate, and beyond.

Such a union station as this might have been the very best place for the city terminus of the new line. It would have saved a large proportion of the most expensive part of the work of the new road. It would have given the passengers by that road the greatest possible facilities for communicating with all parts of the town, or crossing directly to the great southern and western lines. But if that new road did not utilise these sites, there would be plenty of traffic for the grand avenue without it.

Again, going to the south, I believe it would be found practicable to carry Surrey-street under the Strand, and thus provide an opportunity for a large proportion of the traffic from Holborn to the Embankment, to avoid the great confusion of crossing the Strand by the surface roads. This might be found more valuable than simply widening Surrey-street, as proposed by the Council.

As Norfolk-street is a better communication between the Embankment and the Strand than any other for a long distance on either side, that communication should not be disturbed.

As suggested by the accompanying sketch, Norfolk-street might be widened on the west side, and if the present grade was preserved, the entrance to the bridge would commence at Howard-street. Although the grade is a little heavy from the Strand to Howard-street, for so short a distance it would not be very objectionable.

On the Surrey side of the river there would be but little difficulty in extending the avenue to the Elephant and Castle, either by a new street through property now almost valueless for want of proper streets, or by connecting with and enlarging the present streets and roads.

RAPID TRANSIT.

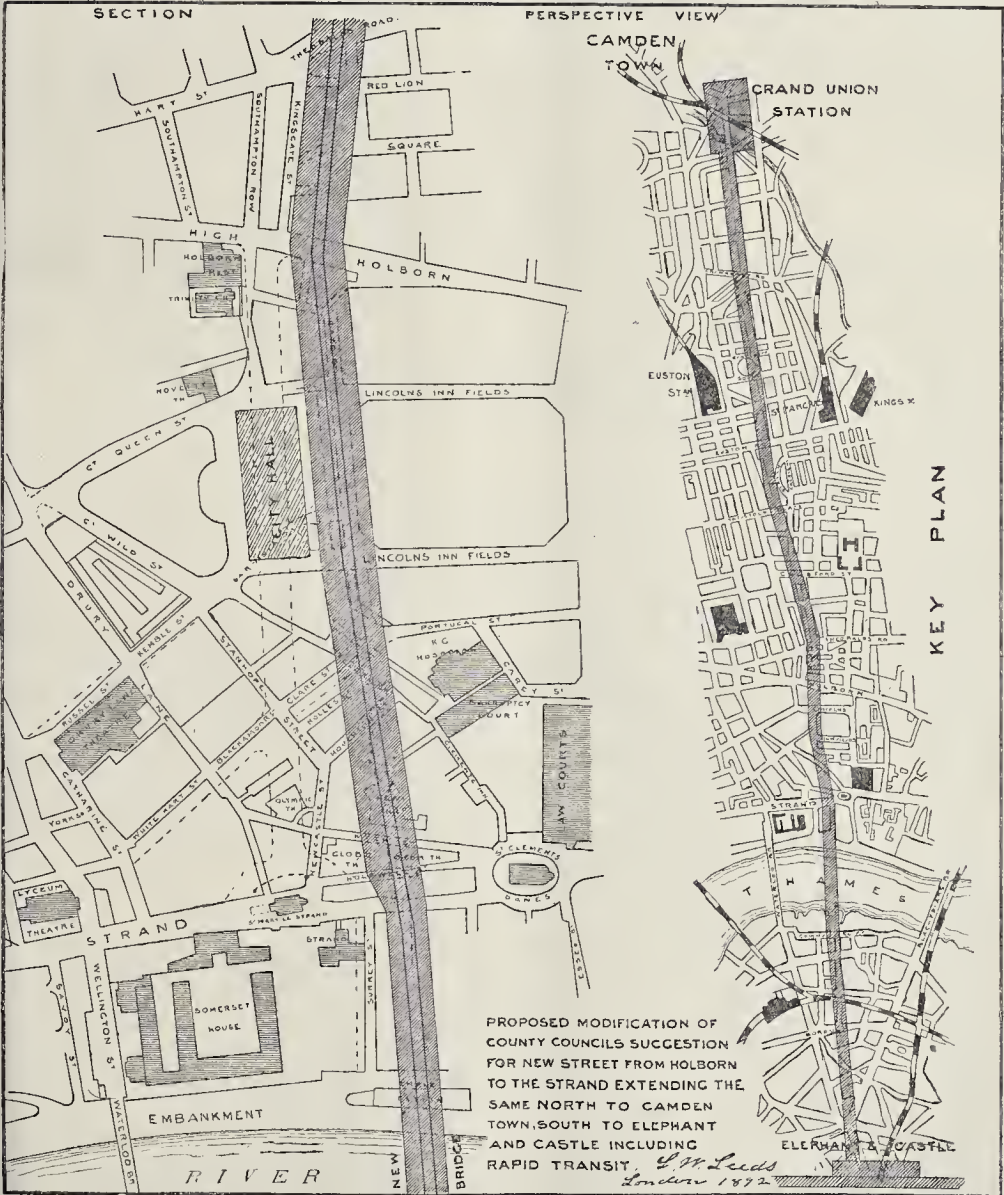
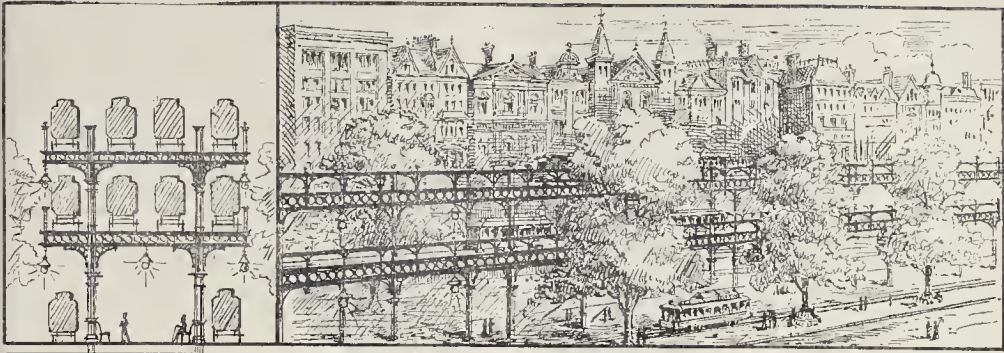
Few persons would deny that in a great connecting avenue like this some method of easy, pleasant, and rapid communication would be most desirable.

How can such an important end be gained?

Londoners are quite justified in their universal abhorrence of the very name of "elevated roads." All such roads in London are so gross, so atrocious, cumbersome, monstrosities, that they are the curse of the whole neighbourhood through which they pass. Such structures, however, are not necessary. Electricity is rapidly superseding steam and horse power. It is expected that in the United States alone 30,000 horses will be superseded each year by electric power in propelling passenger cars. As these cars would be scarcely more than one-tenth the weight of the heavy locomotives a much lighter structure would be required. Railway engineering has recently made such immense strides which, with the substitution of steel and wrought iron as applied at the present day, would enable a light, graceful structure to be made, entirely sufficient for perfect safety, and yet it might be such a beautiful, graceful, and well-proportioned work of art that it would be a real ornament to the handsomest boulevard in the world. As there would be no dust, smoke, gas, or condensation from these electric cars, there could be no possible objection to their race being two stories in height.

I have indicated in the sketch four tracks in width and two tracks in height, making eight in all. These placed in the centre of an avenue 150 ft. or 190 ft. wide, with trees on each side of the track, would make a most delightful method of travelling. And it is a most beautiful avenue like this used for business, or even residential purposes, these light, graceful, electric cars would be less objectionable than the ordinary omnibus or hansom. There would also be room for two or more surface tracks for local traffic.

For mere pleasure, or as an afternoon lounge, such an avenue would not be equal to the Champs Elysées of Paris, but as a combination of business and pleasure it would be entirely unequalled by any avenue in the world. It would not be unreasonable to estimate that on the completion of such an avenue as this, if carried out in its entirety, there would be at least 50,000,000 of passengers carried over the railways alone in the first year, and this number would soon increase to 100,000,000.



The New York elevated roads carried over 195,000,000 last year on thirty-six miles of track. This, with the bus and carriage traffic and foot passengers, would make it a most important thoroughfare. This great publicity means commercial value. The great width of the avenue would allow of the erection of buildings many stories in height, with the modern lifts, telephones, and every convenience, with subways for power, electricity, steam, &c., and tracks for delivering freight directly on the premises, if desired.

The expense of constructing such an avenue would be very great, but a careful examination might prove that the greater publicity and the additional sources of income would make it more certain to pay a good return on the larger sum than on the present more restricted proposition of the County Council.

If the City built the street with the railway tracks completed, these tracks could be rented to responsible companies for sufficient to pay the interest on a large proportion of the capital required for the construction of the avenue.

It is to be hoped that the Committee who are to prepare the Bill to be promoted in Parliament for powers to construct this central portion of the grand avenue will secure the right to modify the location sufficiently to unite with any required extension to the north or to the south.

Although there is a most urgent necessity for an avenue between Holborn and the Strand, yet it would be better to defer the opening one or even two years rather than to find, after expending three or four millions on the central section, that it was located 50 or 100 yards out of the way for connecting in the best and most harmonious manner with the much-desired extension to the north and to the south.

LEWIS W. LEEDS.

West Dulwich, August 2, 1892.

GENERAL BUILDING NEWS.

LOED GAINSBOROUGH'S MANSION AT EXTON PARK.—We are informed that the Earl of Gainsborough has, during the last thirteen months, been making alterations and additions to his Rutlandshire seat. The works now approaching completion consist of a connecting corridor between the mansion and the outstanding block of buildings on the north-west side. A temporary passage on the ground floor has been strengthened, and a garden entrance formed thereto with folding oak doors in moulded stone mullions with Tudor side lights, a large two-light mullioned and transomed window being also inserted. The upper corridor, 90 ft. in length, is lighted by twelve lights partly filled with Burt & Pott's casements in stone mullions, a bold parapet finishing the whole, which is panelled and treated with Tudor tracery, the old finials being restored in new stone bases. The difference in the levels of the buildings of 4 ft. is met by a broad flight of steps with turned moulded oak newels at the north end, leading to a lofty Tudor archway. The large octagonal turret flanking the corridor has also been restored. A bath-room, lavatories, &c., fitted up with Winton's (Croydon) fittings, and other minor alterations have been included. The material used in the fronts is the local stone, with Ancaster stone dressings. Mr. Henry Hollis, of Cottesmore, has carried out the works, and Mr. Thompson of Oakham, the plumber, Mr. Lunn, of Great Malvern and Portsmouth, being the architect. Mr. Lunn has, we hear, examined the fine old court house adjoining, now a ruin, the heavy roof of which is endangering the walls. It is thought that a new roof would modernise the building too much; it is, therefore, probable that a great portion of the roofing will be entirely removed and the weak parts of the walls repaired.

MISSION HALL, TR PHIL, GLAMORGANSHIRE.—A new Mission room and Sunday School, erected at Tr Phil for the Rev. P. Rees, vicar of Pontlottyn, was opened by the Bishop of Llandaff on Sunday last. Accommodation is provided for about 200. The building is domestic Gothic, plain in style. The walls are of native stone, faced with shoddies, and the window reveals and buttress weatherings are in Ebbw Vale red pressed bricks. The roof is covered with green slates and red tile ridge. Mr. Owen Lewis, of Cardiff, carried out the work, from the designs and under the superintendence of Messrs. Veall & Sant, architects, Cardiff. Mr. S. Evans executed the lead lights; Messrs. Brown & Co. supplied the ornamental ironwork and gas-fittings; Messrs. Warner & Sons the metal bell, whilst Messrs. Hammer & Co. supplied the special convertible seats. The new building is erected on a site given by Mr. Aurelius, of Tr Phil, and is dedicated to St. Michael. It is intended to erect a church on the same site as soon as funds permit.

MUNICIPAL BUILDINGS, OSWESTRY.—The foundation-stone of the new Municipal Buildings at Oswestry, to be erected on the site of the old Guildhall on the Bailey Head, was laid by the Mayor (Mr. A. Wynne Corrie), on the 29th ult. The old bas-relief of St. Oswald, the patron saint of the town, which was on the pediment of the old Guildhall, will be introduced into a new edifice. The Municipal Buildings will include a

central hall, Council-chamber, magistrates' and County-court room; Town Clerk's, Borough Surveyor's, Magistrates' Clerk's, Assistant Overseer's, and County-court offices; rooms for the Reference and Lending Libraries, and Schools of Science and Art, &c. The amount of the contract for the work is 8,597. The original architect was Mr. Cbeers, of Twickenham, whose designs were selected in competition. Mr. T. M. Lockwood, of Chester, is the consulting architect.

INFECTIOUS DISEASES HOSPITAL, WALLSEND.—According to the *Newcastle Chronicle*, the building of the new Infectious Diseases Hospital at Wallsend is being pushed forward rapidly. The site of the new building is about a mile on the north side of Wallsend. The area covers two acres, and the erections within the enclosure comprise four distinct blocks of buildings, the front or western entrance rising to the height of three stories. Accommodation is here provided for the resident surgeon, matron, porters, nurses, and attendants, together with a large kitchen and sculleries. The south block is built on the pavilion style, and is divided into two compartments. Six beds are provided in this ward, and the rooms are lofty, well lighted, and well ventilated. The east block consists of laundries and wash-houses for the disinfecting of linen. In connexion with this division is placed a patent disinfecting stove, and a separate block of bedding and clothing. The north block is also erected in the pavilion style, with six beds for males and six for females, in addition to rooms set apart for the use of the nurses. A mortuary and ambulance are also provided within the enclosure. The present accommodation includes eighteen beds for the use of patients, and provision is made for increasing the number to thirty if required, by the erection of another pavilion block, space for which has been left at the east side of the enclosure. Near the main entrance portico, immediately over which is a verandah of trellis-work, a charge-room is situated, through which all patients must pass on leaving the building. This verandah consists of three apartments, the first being set apart as an undressing room, the next as bath-room, and the third as dressing-room. The various blocks are plain but substantially built, the floors being laid with oak beams, and the walls of all the apartments will be plastered with adiantum and Parisian cement. Each block and wing of the building has a separate system of drainage. Mr. Nichol Richie, of Whitley, is the contractor for the whole of the buildings in connexion with the structure. Mr. Lister, of Howdon, is clerk of the works, the plans having been prepared by Mr. Wm. Hope, of Newcastle, under whose superintendence the work is being carried out.

NEW WING, BRIKESHED INSTITUTE, BRIKESHED.—The new wing of the Brikeshed Institute, Whetstone-lane, Brikeshed, was opened by the Mayor (Mr. Alderman Charles Willmer) on the 29th ult. Some time ago Mr. Henry Tate gave a donation of 1,000l. to the institute, with the express wish that a thoroughly fitted laboratory should be provided out of that sum. The committee resolved at the same time to build an entire wing, as the growth of the school had rendered that course necessary. The ground floor has two class-rooms, 24 ft. by 22 ft., and corridor, 45 ft. by 8 ft., with two entrance porches. On the first floor is another class-room, 24 ft. by 22 ft., and a physical laboratory, called the "Tate Laboratory," 35 ft. by 22 ft., and 20 ft. high. The latter is fitted up with benches for twelve. When completely fitted up there will be accommodation for twenty-four pupils. The balance-room is connected with the laboratory. The buildings provide additional accommodation for about 120 boys, exclusive of the laboratory. The facade to Whetstone-lane is of Storeton stone, the windows having moulded and deeply recessed jambs, the laboratory being emphasised by a pedimented gable. The south gable is of brick, so that when the building is finally completed by the addition of the south wing this will become an internal wall. The corridor is paved with wood blocks, and special attention, it is stated, has been paid to the ventilation. Mr. T. Mallard Reade, of Liverpool, was the architect, and the sole contractor for the work was Mr. James Readdy, also of Liverpool.

NEW CHURCH, SALINBY, NEAR CHESTER.—The foundation-stone of a new church at Salinby has just been laid by the Countess of Grosvenor. The new church, which is dedicated to St. Mark, is being built on the south side of the road leading into Salinby from Chester. It is set back from the road 40 ft., and entered by a half-embowered porch. The nave is 37 ft. 6 in. long by 34 ft. wide. The chancel is two steps up from the nave, and on either side are the organ-loft and vestry. The church will seat 325 people. The elevations are treated in Ruabon red bricks with white Manley stone facings, the roof being covered with small Westmorland green slates. The contractor for the work is Mr. W. W. Freeman, of Chester, and the architects are Messrs. Thomas M. Lockwood & Sons, also of Chester.

ST. JOHN'S CHURCH, COLSTON BASSETT, NOTTINGHAMSHIRE.—On the 2nd inst. the Bishop of Southwell consecrated the new parish church of Colston Bassett. The edifice is cruciform in plan, a tower springing from the intersection. The

building is of white stone. Five bells from the old church, dating from the beginning of the seventeenth century, have been re-bung; the large tenor bell has been re-cast, and the whole fitted with a chiming apparatus by Messrs. Taylor & Sons, of Loughborough. The east window of stained glass has been carried out by Messrs. Heaton, Butler, & Baynes, of London. The upper part of the pulpit is in oak, and the lower in Corsbam Down Bath stone. It has been supplied by Messrs. Oldham & Knight, of Nottingham, from the designs of the architect. The font has been supplied by the contractors, Messrs. Bell & Sons, from the designs of the architect. The lectern has been supplied by Messrs. Wippell & Co., of London. The altar cross has been supplied by Messrs. Barkentein & Krail, of London. The architect was Mr. A. W. Broull, of Nottingham.

CHURCH, SOUTH WIGTON, LEICESTERSHIRE.—The foundation-stone of the new Church of St. Thomas at South Wigton has just been laid. The new church, which is to cost 3,600l., will be capable of seating (on chairs) about 650 people. The nave will be 95 ft. in length, and the chancel 32 ft. There will be two vestries at the side of the chancel, and over these the organ chamber will be built. The floor is to be of oak blocks, and the roof is to be paved with tiles. Mr. Stockdale Harrison, of Leicester, is the architect.

NEW CHURCH, HUCKNALL TORWARD, NOTTINGHAMSHIRE.—The new church on Watnall-road, Hucknall Torward, was opened on the 4th inst. by the Bishop of Southwell. The building has been erected from designs by Mr. R. C. Clarke, architect, of Nottingham, and built by Mr. J. Whyatt, of Hucknall. It is wholly of brick, and is furnished with twenty-nine leaded lights. The seats are of varnished deal. The building consists of a nave, and enough land has been given by the Misses Jackson to erect a chancel when the need arises.

WESLEYAN METHODIST CHAPEL, TANFIELD LEA, DURHAM.—On the 3rd inst. the new Wesleyan Methodist Chapel at Tanfield Lea was formally opened. The buildings have been designed by Mr. J. W. Thompson, architect, of Newcastle, and have cost about 1,100l. Accommodation will be provided for about 350 persons.

BATHS AND WASH-HOUSES, BOW.—Messrs. John Allen & Sons, builders, Kilburn, write, relative to the paragraph with this heading which appeared on p. 115 of our last issue, that they were the contractors for the works, the cost of which will be about 25,000l., exclusive of engineers' work.

STAINED GLASS AND DECORATION.

WINDOW, FENNY STRATFORD CHURCH.—A stained-glass window of two lights has just been placed on the south side of this church. The subject represented is the Presentation of Our Lord in the Temple, under canopies, in keeping with the style of architecture of the building. The window is the gift of Mrs. Stubbs, of Cleve, in memory of her husband, who was connected with the church for many years. It was designed and executed by Messrs. Warrington & Co., of Fitzroy-square, London.

MEMORIAL TABLET, MUNICIPAL BUILDINGS, NEWCASTLE.—On the 29th ult., at the Municipal Buildings, Newcastle, a monument, erected by the late Mr. Joseph Mayer, F.R.S.A., of Liverpool, to the memory of his father and mother, was unveiled. The memorial is erected on the wall of the first landing of the principal staircase, and it takes the form of a sculptured tablet in high relief. It was executed by Signor G. Fontana, an Italian sculptor, and the work is done in white Venetian marble, the memorial being mounted on a slab of dark marble. On the pedestal at the top of the monument are the busts of Mr. and Mrs. Samuel Mayer, and on either side are figures representing justice and domestic virtue, which are represented in the act of offering a crown of laurel to the persons in whose memory the monument was erected. In the centre there is an inscription.

FOREIGN AND COLONIAL.

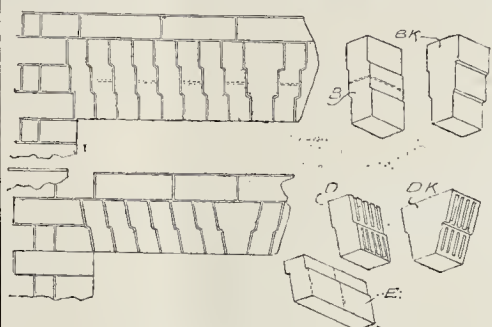
FRANCE.—The Académie des Beaux-Arts has given its judgment on the architectural competition for the Grand Prix de Rome. Ten artists were admitted to the room. Mous. Guerin, Patouillard, Trousset, Duquesne, Bertone, Letronne, Cargill, Heubbs, Deperhues, and Despresdalle. The Grand Prix was awarded to M. Pierre Bertone, pupil of M. Giraïn. The first-second grand prix was awarded to M. Jules Louis Daperthes, pupil of his father and of M. Giraïn. M. Guillaume Trousset, pupil of MM. André and Laloux, obtained the second-second grand prix. As we have already said, the subject was "An Artillery Museum, built in a strong place on the seashore."—In Engraving the grand prix was given to M. Dézarrois, pupil of MM. Henriquet Dupont, Gérôme, Allar, and Levasseur. The first-second grand prix has been obtained by M. Germain, pupil of MM. Blanchard & Bonnat, and the second by M. Mayou, pupil of MM. Bonnat, Levasseur, and Leroy. The subject

was, a nude man standing, and a drawing from a cast of a child holding a swan in his arms.—The service des Beaux-Arts of the City of Paris will soon commence the restoration of the paintings on the porch of St. Germain l'Auxerrois, which is in a deplorable state.—There is a question of moving to the Porte Dauphine, in the Bois de Boulogne, the fine cottages now in the Avenue du Trocadero.—An interesting exhibition has been opened at the Hôtel de Ville of the works executed by the pupils of the municipal school of furniture design. The exhibition contains the furniture and sculpture made by children, who, after four years' apprenticeship, have just finished their time.—There is now on view at the Louvre Museum a head in archaic style, probably about the sixth century before Christ, which closely resembles the sculptures found in the Acropolis at Athens. We may also mention several busts, relieved by bright colours, which had been taken from lids of Egyptian sarcophagi. These busts, which are interesting from an archaeological point of view, are in gypsum.—A gigantic iron cross has just been placed on the summit of Mont Reculet, which is 1,720 metres above the sea, and overlooks the departments of the Ain and Jura, the lake of Geneva, and the Haute Savoie.—M. Hippolyte Lefebvre, the gainer of the Grand Prix de Rome in the sculpture section, has received quite an ovation on returning to his native town, Lille.—The Municipal Asylum at Fontenay-aux-Roses, on the Ledru Rollin Estate, has just been formally opened.—M. Abel Hermant, the son of the well-known architect, has just been charged by the Government with a mission to Egypt, to study the architectural monuments of the country; M. Paul Nicod has been dispatched on a similar errand to Montenegro, to explore the ruins of the ancient Roman city of Diocletia; and M.M. Hamont and Adrien Blanchet have also been charged with archaeological missions, the first to Russia, the second to Germany and Austro-Hungary.—A narrow-gauge "Decauville" railway has just been opened between Toury and Pithiviers.—M. Bischoffsheim, to whom we owe the observatory at Nice, proposes to erect a new scientific establishment on the summit of Mont Moutier, at an altitude of 2,818 metres. The work will be commenced next April.—The ancient chteau of Montangé (Saône-et-Loire), belonging to Count Costa de Beauregard, has been burned. It contained a precious collection of antiquities, pictures, and furniture.—Some rich iron-bearing strata have been discovered in the communes of May-sur-Orne and Fougerolles, not far from Caen.—The death of M. Gustave Costan, landscape painter, a pupil of Calame. He obtained honourable mention in the *Salons* of 1861, 1867, and 1889.—M. Conrath, architect, of Strasbourg, has just died after a long illness. From 1854 to 1886 he was in charge of most of the official work of that city.—We have to record also the death of M. Victor Coutan, engineer and architect, who has died at Gisors, at the age of forty-six.

free them from risk of the ingress of that sewer air from public culverts, which may at any moment be a means of conveying the contagium of imported cholera. Our communities are the more to blame because they can no longer plead ignorance.—*Lancet.*

CHURCH CONGRESS.—The annual Ecclesiastical Art Exhibition, which has of late years been a feature in connexion with the Congress, will take place in part of the building used for the Folkestone Exhibition of 1887. The leading church and school furnishers throughout the country have already signified their intention of exhibiting, and pains are being taken to secure a large and interesting loan collection, &c. Officers of loans should be addressed to the manager, Mr. John Hart, Maltravers House, 17 and 18, Arundel-street, Strand, W.C.

"BUILDING BLOCKS" FOR ARCHES.—The blocks described under this term, to be made of either stone, concrete, cement, or terra-cotta, are invented and patented by Mr. F. M. Holloway, and the special feature of the patent consists in the provision of a set of arching blocks moulded to sizes and shapes suitable for different depths of arch, and ready to be at once placed and keyed up with



Holloway's Patent Building Blocks for Arches.

a key-block out to fit the suit of blocks employed; so that no cutting of bricks is required; the builder has only to order the requisite number of blocks of the depths required. We append a diagram showing the use of the blocks. We presume it is held that the cost of making them would be compensated for by the saving in labour in cutting bricks for arches.

CRYSTAL PALACE SCHOOL OF ENGINEERING.—Mr. Laifner Clark, C.E., F.R.S., past President of the Institution of Electrical Engineers, presided in the new Lecture Theatre of the Crystal Palace School of Practical Engineering on Saturday last, when the certificates awarded by the examiners for the current term were distributed to the successful students. Mr. Clark said that an inspection he had just concluded of the work done in the shops and offices of the School enabled him to say with confidence that, in respect of the curriculum and of the completeness and thoroughness with which it was carried out, the institution was the most efficient of its kind with which he was acquainted. In the course of his address he touched on many technical questions of scientific education, and contrasted the condition of affairs in this country now with England's dangerous deficiency fifty years ago. The certificates were subsequently presented. There are now 112 students in the School. Forty-five students succeeded in passing the examination of the Mechanical Department, the first of whom was A. S. Hollick, with 240 marks out of a possible 278. The same student was first in the Fitting Shop. In the Mechanical Drawing Office W. C. Gravely was first; in the Pattern Shop R. J. Simpson took the lead. For the second year, Civil Engineering, C. R. Hewitt came first in general surveying and the preparation of plans for Parliament. A. H. C. Olley occupied a similar position for calculations, plans, estimates, &c., for a railway and dock. W. A. D. Allport was first for investigation of existing and other engineering works. H. C. Ross and J. C. Lyell were first in the Electrical Section, and M. G. Bradford and C. R. Digby-Jones occupied similar positions in the Colonial Section. The examiners were Mr. J. Phillimore, A.M.Inst.C.E., Mr. David Gravell, A.M.Inst.C.E., and Mr. E. Manville, M.Inst.E.E.

CLOCKS AND BELLS.—A new Cambridge quarter clock, showing the time upon three 7-ft. copper dials, has just been set going at St. Paul's Church, Alnwick, Northumberland. It has been presented by Mr. Percy, County Coroner of Northumberland, in memory of his parents, and the work has been carried out by Messrs. Wm. Potts & Sons, clock manufacturers, Guildford-street and Cookridge-street, Leeds.—Mr. E. Bernard Tyzack, Shirley, Sharrow, Sheffield, has given a new clock, with two large dials and two bells, to the parish church,

Sharrow, Sheffield, in memory of his father. The clock strikes the hours and chimes the quarter-hours. The clock and bells were supplied and fixed by Messrs. Wm. Potts & Sons, Leeds, under the supervision of Mr. J. B. Mitchell Withers, architect, Sheffield.

A SEWAGE-LIMEING MACHINE.—We have received from Messrs. Bowes Scott & Western, some particulars of their new patent sewage-limeing machine, which, we are told, has been designed to supply a want which has been often expressed, of a suitable contrivance for the addition of lime or other chemicals to sewage, in the finest possible state of sub-division. By means of this machine, it is claimed that the great waste which now often occurs during the process is prevented, and the grinding and mixing of the precipitants is effected at one operation. The machine consists of a cylindrical vessel, furnished with internal stirring arms. At the top or rim of this cylinder there is a flange, planed true, which forms the bottom rubbing surface mentioned below. The cover or lid of the machine is made to rotate by means of bevelled wheels, and the underside of the lid is also furnished with a flange, planed true, to form the upper rubbing surface. Both the lid and the agitators are driven by the same belt-gear. Lime, or any other precipitating material, is introduced into the hopper at the back of the machine, and a constant stream of water is at the same time introduced, being kept at a level slightly above that of the rubbing surfaces. This head of water causes the finer portions of the lime to wash over and to pass between the rubbing surfaces into the outer trough, from whence it is discharged into the sewage. In passing through the flanges the hard particles are reduced by attrition to an impalpable powder, and a cream or milk of lime, of the utmost degree of uniformity, is thereby produced, as it will be manifest that only the finest particles, floating near the surface of the vessel, can escape over the lip. The advantages claimed for the machine are that when lime is added to sewage in the usual way it is not in a sufficiently fine state of sub-division to combine with the carbonic and phosphoric acids, and therefore the salts of lime are only formed on the outside of the lime-particles, whilst the insides are virtually useless for the purpose required; a very imperfect precipitation is thus produced, and in large towns, using the lime process, many tons of lime are wasted during the course of the year. The new machine, it is said, reduces the lime to such a fine state of division that every particle is acted upon by the acids in the sewage; moreover, the lime does not require slaking, and the precipitants can be introduced into the sewage with a minimum of skilled supervision.

SOMERSET HOUSE, LINCOLNSHIRE.—At the Mart, on the 18th inst., will be offered for sale Somerset House, Lincolnshire, where, in 1809, his father being then Rector, Lord Tenynson was born. The estate extends to 1,200 acres, yielding a gross revenue of about 1,800*l.* per annum, and includes the Manor house, which is supposed to be the "lonely, moated grange," the "dreamy house," of the Poet Laureate's "Mariana." The poet often mentions his early home in "In Memoriam," see also the lines (with others) in his "Ode to Memory"—

Come forth I charge thee, arise,
* * * * *
Come from the woods that belt the grey hill-side,
The seven elms, the poplars four
That stand beside my father's door.

Vanburgh is said to have designed the Manor-house. Somerset, lying in the Parish of Lindsey, contained, in 1821, twelve houses and ninety-six inhabitants, and belonged to the Burtons. Eleven miles distant is Louth, where, in Edward VI.'s Grammar School, rebuilt in 1766, were educated Lord Tenynson, Hobart Pacha, Sir John Franklin, and Captain John Smith, Governor of Virginia, a native of Wiltshire, who died at the age of 21, June 21, 1831, and was buried in St. Sepulchre's Church, London.

THE ENGLISH IRON TRADE.—Little alteration is apparent in the English iron market, but prices are scarcely so firm as last week. The Glasgow warrant market is again quieter, and the quotation for mixed numbers of Bessemer iron in the north-west is 1*s.* lower. Cleveland pig has, however, advanced 6*d.* per ton. In the finished iron branch business continues inactive and tinplates are dull. The improvement in the steel trade, noted last week, proves to have been merely transient, and heavy rails have returned to their old value of 4*l.* 4*s.*, whilst hillets have suffered a fall of 1*s.* 3*d.* Old iron rails are also 2*s.* 6*d.* per ton lower on the week. Ship-building and engineering exhibit no material changes. The coal trade is fairly steady.—*Iron.*

MISCELLANEOUS.

ROYAL ARCHAEOLOGICAL INSTITUTE.—The annual gathering of this Institute commenced at Cambridge on Tuesday, when a hearty welcome was offered to the members by the Mayor and Corporation at the Guildhall. According to an address read by the Town Clerk, it is thirty-eight years since the Institute visited Cambridge, and the Prince Consort then presided over the proceedings. Earl Percy (the President) thanked those who had welcomed the Institute, and said it was a great pleasure to have that opportunity of visiting one of the great Universities. After luncheon the Architectural Section was opened, and visits were paid to various places of interest. We will give a report of the proceedings next week.

SANITATION AND CHOLERA.—We are credited amongst the nations of the world for having made greater strides towards cleanliness, both public and private, than any other country. But those who have taken part in this invaluable work and progress are, of all others, best aware of the large arrears that have yet to be made up and of the ample room that remains for further progress. There are spots in abundance that seem almost to be waiting their opportunity to impress more emphatically the lesson that epidemic cholera and filth go hand in hand. There is the barbarous and revolting misanthropic system of our northern counties, polluting air and soil by its emanations and soakage; there are similar systems in the south and elsewhere under which it has become a custom to dig two holes in every man's garden and then to pour all liquid filth into one which is called a cesspool, whilst the drinking water is drawn from the other one which goes by the name of a well. There are houses by the thousand in which the drinking water drawn from a cistern which also serves a water-closet, and which is also placed in direct communication with the house-drain by means of its overflow pipe; and there are houses in every town by the score and even by the hundred in which there is no such proper disconnection of house-drain and waste-pipes from the public sewer as to

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.—Continued.

Table with 5 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applicants to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv., vi., & viii. Public Appointments, p. xx.

THE LONDON AND COUNTY BANKING COMPANY (LIMITED).—The report adopted at the half-yearly meeting held on the 4th inst. states that, after paying interest to customers and all charges, making provision for bad and doubtful debts, allowing 35,562 15s. 10d. for rebate on bills not due, and transferring 20,000l. in reduction of premises account, the net profits amount to 182,943. 18s. 2d. This sum, added to 81,452. 16s., the balance brought forward from last account, produces a total of 264,402. 14s. 2d. The Directors have declared an interim dividend for the half-year of 10 per cent, which will require 200,000l. leaving the sum of 64,402. 14s. 2d. to be carried to the Profit and Loss New Account.

CO-OPERATIVE PRODUCTION.—The Labour Association for promoting Co-operative Production, based on the co-partnership of the workers, will again organise an Exhibition of Co-operative Productions at the Crystal Palace, in conjunction with the National Co-operative Festival. The exhibition will be opened on August 20, and it is said that it will be large and of a more representative character than any that have been held.

HOTEL ENGINEERING.—Some improvements in the engineering department of the Grand Hotel, Eastbourne, have been effected. We are informed that the establishment had been fitted with two hydraulic lifts, worked by water purchased from the Water Company. There was also in existence a comprehensive steam service for heating, cooking, and laundry drying purposes, from which the whole of the water of condensation was allowed to run to waste. These two matters have now been dealt with simultaneously in the following manner: A steam pumping engine has been put down in combination with a large hydraulic accumulator, giving a pressure of 150 lbs. per square inch, that is, equal to the maximum obtainable from the street mains, and from this the lifts are now supplied, the waste water being collected and continuously re-pumped. The whole of the condensed water from the steam service above referred to, as well as from the exhaust-pipes of the laundry and pumping-engines, is trapped, collected, and returned to a tank, from which it is pumped hot to the boiler. The net result of the double alteration is stated to be that the saving of coal resulting from the use of the hitherto wasted hot water has proved more than sufficient to compensate for the extra steam used by the pumping-engine. There is, therefore, a positive reduction of coal consumption; while, on the other hand, all the water for the lifts, and half the water for the boilers, is obtained absolutely free of cost. The work has been carried out by Messrs. Archibald Smith & Stevens, of Battersea, who at the same time overhauled both the passenger lifts, and to a large extent reconstructed one of them.

MEETINGS.

SATURDAY, AUGUST 13.

Royal Archaeological Institute.—Congress at Cambridge (continued).

Junior Engineering Society.—Visit to the Crews Locomotive Works.

Liverpool Engineering Society.—Visit to the Mersey Aqueduct Tunnel and Norton Water-Tower, by permission of the engineer, Mr. G. F. Deacon.

MONDAY, AUGUST 15.

Architectural Association.—Annual Excursion, Taunton (concluded).

TUESDAY, AUGUST 16

Architectural Association.—Annual Excursion, Taunton (continued).

Geological Architectural Association.—Visit to Athelstan additions. 6 p.m.

WEDNESDAY, AUGUST 17.

Architectural Association.—Annual Excursion, Taunton (continued).

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8.30 p.m.

THURSDAY, AUGUST 18

Architectural Association.—Annual Excursion, Taunton (continued).

FRIDAY, AUGUST 19.

Architectural Association.—Annual Excursion, Taunton (continued).

SATURDAY, AUGUST 20.

Architectural Association.—Annual Excursion, Taunton (concluded).

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

11,618.—PORTLAND CEMENT: T. H. Lodge.—This patent refers to improvements in the manufacture of Portland cement and materials of a similar nature, in the apparatus used. It has for its object a greater economy of labour and fuel, and the use of a compact apparatus for the purpose. The details of the invention can only be understood in connexion with the numerous drawings annexed to the specification.

125,534.—DOOR-CHAINS: W. J. Gibbons.—This invention relates chiefly to the part called the box, which is made of sheet metal in the following way.—A strip of metal of the required length and width is taken, and by the aid of dies used in connexion with a stamp, press, or draw-bench, the centre of the strip of metal is raised, and a flange formed on either side for the reception of the screw-holes. When the dies are used in connexion with a draw-bench the metal is drawn in long strips and cut to the required length afterwards. A slot is then pierced in the box, thus forming a similar slot to that in the box of an ordinary door-chain, except that at intervals notches are cut in the edges of the slot, in either of which the hook attached to the chain may be placed, thus allowing the door to be secured at various points. An additional notch is cut at the extreme end of the box, which allows the door to be securely fastened when closed. The notches are cut on both the top and bottom edges of the slot, so as to be available for either right or left-hand doors. The notches are the most important feature of the invention, and may be applied to any make of door-chains.

14,793.—BRICKS: H. Holmway.—This invention relates to improvements connected with building bricks, and its object is to adapt them for being bound together in a more efficient and permanent manner than heretofore. It consists in forming slots in or through the bricks before they are burnt, into which the ends of cramps or ties engage, and so bind the bricks together. These ties may be laid in any direction, so as to bind as may be desired.

15,310.—BRICKS: J. Hamblet, Jun.—In bricks for pavements and floors it is customary, in order to improve their foothold, to make on the tread surface raised parts or projections of a lozenge or other shape, forming an ornamental raised pattern on the face of the brick. The inventor effects the same object by making in the tread surface a series of holes or depressions of any desired shape and size, preferably arranged in an ornamental pattern, the holes or depressions being formed in the moulding operation. These depressions may be allowed to be filled with grit after the bricks have been laid, or they may be automatically secured against being filled, or they may be filled with a material which will improve the foothold, such as cement, India-rubber, iron, wood, tar, and asphalt. This material may either be situated at the same level as the tread surface or slightly raised above it.

16,105.—SASH-PASTENERS: J. H. Karnton.—The object of this invention is to provide a means whereby a window or other catch, automatically secured against opening from the outside by the act of closing the sash. To the lower sash is secured a plate having a projecting tooth thereon, and to the upper sash a plate or frame member, which, when the sash is closed, causes the tooth to engage with a projection on the inside of the upper sash, thereby preventing the window from being opened from the outside. The tooth is formed in the shape of a hook, and the projection on the inside of the upper sash is formed in the shape of a ring, so that when the window is closed the tooth pushes the catch out of the way, and as soon as the sashes are completely closed the catch automatically fastens the same, the centre of gravity of the catch being below the point of suspension. To enable the window to be opened the catch is moved to allow the tooth to clear it, and permits the sashes being raised or lowered.

10,309.—SASH-CORDS: W. H. Naylor.—The object of this invention is to provide an exceedingly strong and durable twist sash-cord, which will not stretch or untwist. Ordinary cords or ropes are objectionable for many purposes, because, in order to attach them, an eye knot, loop, or other connexion must be formed at each end for securing the various attachments, or for preventing untwisting of the cord, and in the case of a sash-cord square weight's must be employed to prevent the cord from untwisting. The inventor proceeds first to make a twisted cord with a loop at each end, and then doubles this cord and again twists it, so as to form a single eye or loop at one end of the cord, and a double eye or loop at the opposite end, and to prevent untwisting of the cord this double eye or loop is engaged by a hook, ring, or other retainer. A cord of this character is stated to be extremely strong and durable, owing to the doubling and twisting of the cord during its manufacture, and that cord will not stretch materially in use.

NEW APPLICATIONS FOR LETTERS PATENT.

July 28.—13,564. C. Bond, Hone-roofs.—13,573. J. Kirtley, Exhaust Ventilators and Smoke Prevention Chimney-tops.—13,577. J. MacLish, Smoke-testing Machines for Testing Drains, and Soil, and Waste Pipes.—13,583. G. Lewis, Securing Glass Plates to Walls, Ceilings, &c.—13,587. F. Marvick, Tiles.—13,592. J. Bloomfield, Plaster.—13,812. R. Burton & A. Louis, Drain and Joist.—13,623. W. Bramley, Plances.—13,628. P. Jones, Window-sash Fasteners.—13,644. H. Lake, Metal Sashes.

July 27.—13,670. G. Greenway, Mitre Cramps.—13,725. C. Wagner, Central Ventilators and Pumps.

July 28.—13,753. E. Wiseman, and J. Holroyd, Water-waste Preventers or Flushers.

July 28.—13,809. H. Cannon and H. Michaux, Metal Drains and Connectors from for all Buildings, and together in a more efficient and permanent manner than heretofore. It consists in forming slots in or through the bricks before they are burnt, into which the ends of cramps or ties engage, and so bind the bricks together. These ties may be laid in any direction, so as to bind as may be desired.

July 30.—13,856. G. Binswanger and H. Coates, Electric Bells.—13,863. C. Scholes, Pneumatic Air or

NEWPORT (Mon.)—For rebuilding 41, High-street, Newport, for Mr. J. Thomas, Messrs. Habershon & Pawkner, architects, Newport.—
 T. Webb..... £1,797 J. Linton..... £1,730
 H. H. Bennett..... 1,773 Jones & Son..... 1,727
 E. Richards..... 1,773 Morgan & Roberts..... 1,727
 Diamond..... 1,781 W. Price..... 1,710
 C. Lock..... 1,759 W. Wilkins..... 1,710
 Wm. Moore..... 1,747 Blackbourn*..... 1,693
 Westcott..... 1,720 [All of Newport.]

NEWPORT (Mon.)—For rebuilding 42, High-street, Newport, for Mr. G. Oliver, J.P. Messrs. Habershon & Pawkner, architects, Newport.—
 T. A. Edmund..... £1,983 Morgan & Roberts..... £1,923
 W. A. Linton..... 1,975 J. Linton..... 1,835
 E. Richards..... 1,953 W. Price..... 1,814
 Jones & Son..... 1,947 G. Wilkins..... 1,800
 G. Lock..... 1,925 Blackbourn*..... 1,677
 Westcott..... 1,929 [Accepted.]

NEWPORT (Mon.)—For rebuilding 120 and 121, Commercial-street, Newport, for Mrs. Rowe, Messrs. Habershon & Pawkner, architects, Newport.—
 T. Webb..... £1,759 Jones & Son..... £1,660
 G. Lock..... 1,623 Morgan & Roberts..... 1,660
 W. Price..... 1,623 G. Richards..... 1,635
 W. Moore..... 1,615 Williams, Rees & Son..... 1,453
 J. Linton..... 1,593 T. G. Diamond*..... 1,430
 W. A. Linton..... 1,580 [Accepted.]

READING—For the erection of engineers' and carpenters' shops at the Thames Bank Ironworks, Vauxhall-road, Reading, Mr. W. H. Bell, architect, Newbury.—
 G. G. G. G. £307 10 T. Pilgrim..... £210 0
 W. Hawkins..... 437 0 T. H. Kinginger, Queen-street, Oxford..... 295 0
 G. A. T. Russell..... 320 0 A. S. Shonards..... 275 0
 Patience & White..... [Accepted.]

READING—For the erection of Western Chapel at Oxford-road, Mr. F. Borcham, architect, 75, Finchbury-gate, E.C.—
 Margitts..... £4,783 Higgs & Son..... £4,208
 Baskley..... 4,709 G. H. Martin & Co..... 4,434
 Whiter & Tilt..... 4,340 Botteri & Son..... 4,295
 Collier & Catley..... 4,359 W. Jolley..... 3,983

THORNTON BRATH (Surrey)—For the erection of six cottages in Land road, for Mrs. Sumner, Mr. J. Sargeant, surveyor, 4, Middlesex-street, S.W.—
 Smith & Sons..... £2,025 Burtell..... £1,763
 Head..... 1,923 Baskin..... 1,736
 Sager..... 1,900 W. Staich..... 1,693
 G. H. Martin & Co..... 1,707

TOTTENHAM—For erecting a pair of villa residences at Park Green, Mr. Alexander Gordon, architect, 101, Queen Victoria-street, E.C.—
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 Tannah..... 700 9 1/2

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ILLUSTRATIONS.

Somersetshire Churches Visited by the Architectural Association: Crech St. Michael, Ralahton, St. James's Taunton, Kingston St. Mary, St. Mary's Taunton, Bishop's Lydeard	Double Page Ink Photo.
Cotthelstone House and Church.—Drawn by Mr. Roland W. Paul	.....	Single Page Ink Photo.
Coombe Sydenham Manor-House.—Drawn by Mr. Roland W. Paul	.....	Single Page Ink Photo.
Trull Church, Somerset: Roodscreen, Pulpit, Windows, &c.—Drawn by Mr. R. W. Paul	.....	Single Page Photo-Litho.
Taunton Castle: Courtyard and Gateway.—Drawn by Mr. R. W. Paul	.....	Single Page Photo-Litho.
Manor-House, East Quantockshead.—Drawn by Mr. R. W. Paul	.....	Single Page Photo-Litho.
Church and Manor-House, Bishop's Hull.—Drawn by Mr. R. W. Paul	Single Page Photo-Litho.

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The Architecture of West Somerset.



OT the least interesting feature of the architecture of Somerset is the even distribution of its interest. No portion of the county hut will well repay the architect for visiting it, and the diversified country in which houses and churches are placed enhances their beauty and gives the district an additional interest. That portion of the county known as West Somerset,—roughly speaking, that which lies between the Parret river and the northern half of the Devon boundary,—is of very marked value in its architecture. The Wells district is essentially an ecclesiastical one, the Yeovil district as essentially a domestic one, but the portion of the county for which, in a great measure, Taunton affords a convenient centre, is equally rich in both churches and manor houses. There is nothing of the grandeur of Brympton or Montacute, or anything to equal the glorious grouping at Wells, hut the examples to be met with are extremely valuable, a value which is here very largely increased by the natural beauties of the scenery, showing clearly how ready and capable our forefathers were in taking advantage of their surroundings, and building in harmony with them. The presence of a coast-line is generally an important factor in the treatment of the architecture in its neighbourhood, and both hills and valleys have their influence. In West Somerset all are to be found,—the coast-line commencing with the flat country at the mouth of the Parret, and finishing at the western boundary of the county in the lofty hills of Exmoor. A little way back from the coast and parallel with it are the Brendon Hills, while from its centre the Quantock Hills run southward, and hending east form a natural protection to the Vale of Taunton Deane.

exposure to the elements and to attack rendered this necessary, and the house at East Quantockshead, on its knoll near the sea, and the more imposing example at Dunster, speak very clearly of the times when "an Englishman's house was his castle" in the fullest sense of the term. Dunster Castle, on its commanding hill at the entrance to Exmoor, is full of associations of the times of the Parliamentary wars; and East Quantockshead,—although not actually a fortress,—bears a distinctly fortified aspect, especially when seen from a distance. Further east were the castles of Stogursey and Bridgwater, both now little more than a name, hut each playing their part in the history of the county.

The churches, too, partake of much the same severity of treatment. Perhaps there is no greater contrast to be had than between the churches of the coast, and the elaborate examples in the interior of the county,—the former with their walls pierced only where absolutely necessary for light, often plain at the west end, and with towers built in some places to serve as landmarks, or as seacons and look-outs; in others kept stunted so as to offer the least possible resistance to the westerly gales from the Atlantic. St. Decuman's tower may be seen for many miles standing sentinel over Watchet, whereas the little churches of Quantockshead and Kilve are typical of those which seem either to crouch under the shadow of the manor house, or shelter themselves behind the sand dunes. Directly the coast-line is left and the valleys between the hills are reached, a very marked change occurs. Most of the Mediæval manor houses, as is well known, were built in the valleys in preference to more elevated situations, and the situation of Coombe Sydenham is an excellent example. This house,—a very interesting one,—is almost entirely surrounded by hills, in part densely wooded, and its gabled tower no doubt was built partly in order to command its only open side,—that towards the north.

Yet another change is observable on reaching the Vale of Taunton Deane. Cotthelstone and Bishop's Hull have little or nothing to suggest a fortified dwelling,—they stand as good examples of the residence of the more wealthy classes of the days of Elizabeth, and

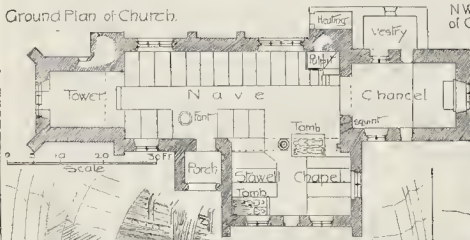
no doubt had their surrounding gardens trimly kept, hut the latter have now entirely disappeared. The ordinary plan is here carried out,—a central block with or without a central porch,—and projecting wings,—projecting both back and front, and taking the form of the letter H with the centre stroke in longer proportion to the upright ones. The family arms occupy a panel over the chief entrance, and, on entering, the "screens" hall, and withdrawing rooms are arranged on the plan so very generally adopted at the date at which they were built,—the sixteenth century.

The churches undergo a like change. The comparatively plain towers of the coast give place to the elaborate towers of St. Mary's, Taunton, Kingston St. Mary, and Bishop's Lydeard, while the main bodies of the churches are more spacious and more abundantly lighted.

This comparison of exteriors does not, however, apply to the interiors. Those of the coast share, with their more sheltered neighbours, fairly equally in elaboration of detail. More especially in the neighbourhood of Williton, an abundance of internal plaster work in the houses is to be met with,—in one case at Stogurmer in the way is now a cottage,—and the beauty of the friezes and mantel-pieces is in some cases exceptional. East Quantockshead, Dunster, Minehead, and other places have their examples, the first-named place being particularly rich. It is very generally supposed that this work was executed by the same body of men, and the similarity and general excellence of the work points very strongly to the supposition that it emanated from the same source, and was, perhaps, designed by the same hand. The comparatively plain character of the exteriors of the churches is more than balanced by richness and interest in their interiors. Those of Dunster, Timberscombe, Carhampton, and Bicnoller are all very fine and in good condition, and the elaborate example at Trull, near Taunton, with its quaint pulpit and hench-ends, must not be forgotten. Here, as in the neighbouring county of Devonshire, the hench-ends are a great feature. Some of the churches, such as Bicnoller, Bishop's Lydeard, Kingston, Sampford Brett, Cotthelstone, Trull, and East Quantockshead are

Cornelstone, Somerset

Ground Plan of Church.



Cornelstone House The Entrance Gateway

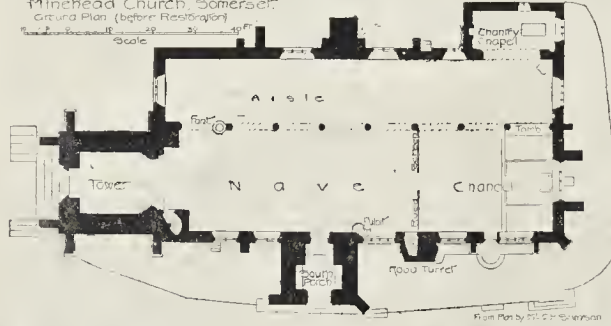


Cornelstone Church Interior showing one of Stawell Tombs

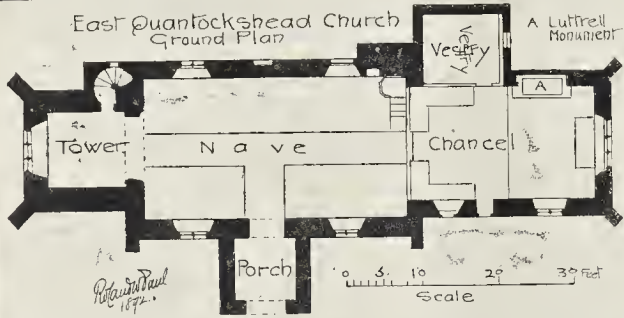


Minehead Church, Somerset

Ground Plan (before Restoration)



East Quantockshead Church Ground Plan



At Bishop's Hall are some quaint figure subjects, and altogether these bench-ends are a study in themselves.

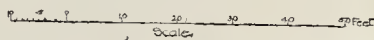
The mere mention of such families as Sydenham, Trevelyan, Luttrell, and Musgrave, Mohun and Wyndham,—names which are intimately associated with the ownership of the manor houses,—is a guarantee that the monuments in their several churches will be of historic interest and artistic value. The interesting series at Dunster, the Luttrell monument at East Quantockshead, the Wyndham tombs at St. Decuman's, and those of Musgrave and Sydenham at Stogumber, with Raleighs and Trevelyans at Nettlecombe, make a very good series of memorials of almost every kind, from the early slab and conventional cross-legged effigy to the richer examples of the Renaissance. A particularly beautiful slab of black marble to one of the Musgraves, now in the South Chapel at Stogumber, deserves especial notice for its lettering and the freedom of its lines and execution. Perhaps still more freedom is to be seen on a small mural monument in the nave of Creech St. Michael to a member of the Trivitt family. Delicacy of engraving on marble could probably go no further. Fonts and pulpits are varied,—an elaborate font is found at St. James, Taunton, others of a good kind at Minehead, Stogumber and Nettlecombe, this last example partaking more of the Norfolk character in having the seven sacraments carved on the sides of its bowl. A fifteenth-century stone pulpit occurs at Stogumber, and elaborate wooden ones at Bridgwater and North Petherton. The wood roofs are in many cases remarkable for the richness of the cornice covering the wall-plates, very good examples occurring at St. Decuman's, Cleeve, and Creech St. Michael.

Two other points remain to be noticed,—the monastic establishments and the chapels attached to the manor houses. In the first category Cleeve Abbey takes the first place,—a beautiful example of the domestic portion of a Cistercian monastery standing almost complete, and in good preservation.

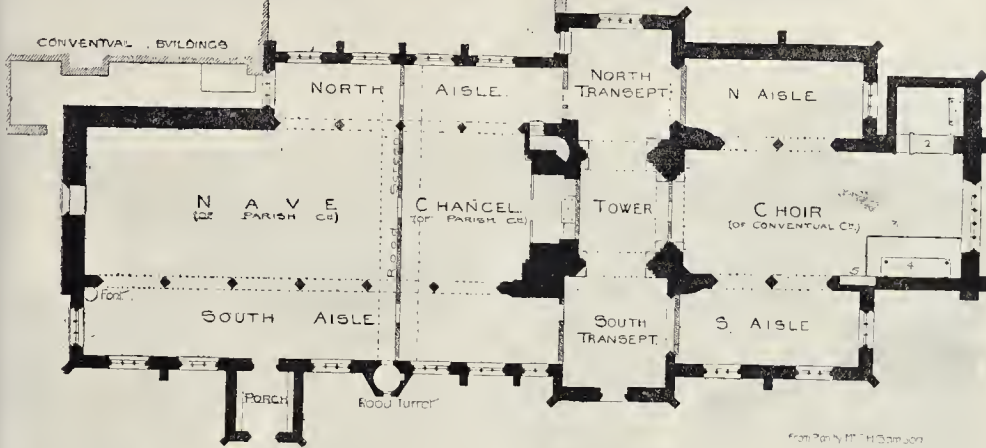
almost entirely pewed with their old bench-ends, many of them highly valuable in their heraldry and other carvings. At Cornelstone we find the arms of the Stawells, at Quan-

tickshead those of the Luttrells, while at most,—particularly at Bicoller,—are several very beautiful specimens of foliage, including the lilies in a pot, emblematic of the Virgin.

DUNSTER CHURCH.
GROUND PLAN (before restoration).

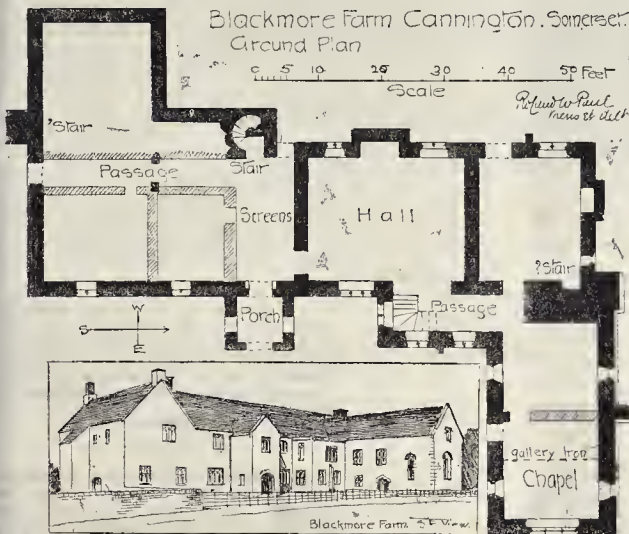
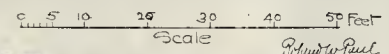


- 1 Chapel of St. Lawrence
- 2 Monument of Sir Hugh Luttrell & wife Catherine c1423
- 3 Effigy of Lady Elizabeth Luttrell 1493
- 4 Monument of Thomas Luttrell & others c1651
- 5 Effigy of Everard



From Plan by Mr. H. St. John

Blackmore Farm Cannington, Somerset.
Ground Plan



Blackmore Farm, S.W. View

Lower Marsh Farm near Dunster Somerset.
The Porch & Chapel.



Plan of Porch

It has been cleared of the farm rubbish which had accumulated in its beautiful cloister quadrangle, and stands both as an example of beauty of workmanship, beauty of situation, and of the loving care which has been bestowed upon it by its owner in recent years to keep it as far as possible from further desecration. Cleeve Abbey has been so often described that it is almost needless to do so here, but no visitor to it will omit to notice its gateway, its refectory, and the tile pavement which was found on the site of the church, and in the domestic buildings*
Of lesser monastic houses, we have Dunster, Kilve, Bridgwater, Cannington, and Taunton. Dunster Church, as at Arundel, retains under one building the double altar,—parochial and conventual,—the former under the tower, the latter at the extreme east end. Kilve Priory is but a shell, but with some interesting

detail in the windows; and all that is left of the Priorie of Bridgwater and Taunton are a doorway and barn respectively. Cannington Priory has been much altered and rebuilt, but has some interesting late work near the church, which in itself is an interesting building.
Of chapels attached to manor houses there are three interesting examples,—namely, at Blackmore Farm, Gurney Street (both near Cannington), and Lower Marsh Farm, near Dunster. The former is the most important, both as regards size and preservation, and, in addition to its altar niche, preserves an upper gallery, which projects on the first floor level into the chapel, and which was used by the owner and his family, the retainers occupying the space on the ground floor underneath. At Gurney Street the chapel is smaller, with a panelled ceiling, and at Lower Marsh Farm it is over the porch.
At Taunton itself there is much of interest. The Castle, with Norman work and later

additions, its picturesque southern entrance and the memories of Judge Jeffreys and the horrors of the Bloody Assize, are all points that claim notice. Taunton was not a walled town. There were apparently "gates" at the principal road approaches to the town, but nothing of the nature of a complete enclosing wall. Besides the Castle and the two parish churches of St. Mary and St. James, there are the remains of the Priory; the Grammar School (opposite the Castle), founded by Bishop Fox, of Winchester, and bearing his arms; the Almshouses, known as Greys, in East-street, a solid-looking brick building, with sturdy chimney stacks; and the more humble, but more ancient, Almshouses at the extreme eastern boundary of the town, with the initials and mitre of Richard Beere, Abbot of Glastonbury.
Enough has been said to show that this portion of Somerset is very full of interest, and justifies the selection which the Architectural Association has made in choosing the

* Tiles of similar pattern occur at Dunster and St. Decuman's,—the latter a good series.



Old Yarn Market, Dunster. Drawn by Mr. Harry J. Hicks.



Cleeve Abbey.
The Entrance Gateway
(south side)

district this year for their annual excursion. They have now visited Somerset on three occasions,—travelling over fresh ground each time,—and it is satisfactory to know that a county so rich as this is in architectural treasures has thus had a very fair share of attention.

NOTES.

IMPORTANT works of restoration or repair (we fear rather the former than the latter) are shortly to be commenced at Mont St. Michel. The central tower has long been in a dangerous condition, and will have to be to a great extent rebuilt, the scheme for the work presented by M. Petitgrand, the present official architect in charge of the structure, having been approved by the Commission des Monuments Historiques. The proposed operations include, in the first place, the repair of the foundations of the four main piers of the crossing; secondly, the taking down entirely of the upper stage of the tower and its reinstatement "dans son aspect d'autrefois"; in other words, the seventeenth century portion of the tower is to be removed altogether, and to be replaced by a restoration of the original Romanesque termination. It will be crowned by a slated conical roof, somewhat higher than the existing one. This work is also considered to render necessary the reconstruction of the adjacent portions of the nave and choir. Those who have not visited Mont St. Michel had better therefore lose no time in doing so, if they want to see it before it becomes a modern imitation of Early Gothic. The work will take about four years, and as funds for it are insufficient, it is proposed to exact a small entrance-fee

from visitors, to go towards the expense of the work. This is the last straw, one may say. It is bad enough to behold the spectacle of the transformation of such a monument into a modern "restoration," without being made to contribute to the funds for carrying it out.

IN Berlin and Vienna it has for some time been taken for granted that the cholera epidemic in Russia is more wide-spread than the official reports published at St. Petersburg will have it. After careful investigation on the part of the Governments having their seats in the two capitals first named, it was decided that not only must the preventive measures taken at the frontiers for the purpose of avoiding an introduction of the plague be enforced, but that preparations must be made in the cities and towns to enable them to resist the epidemic if it chances to pass beyond Russian territory. Whilst publicity has been intentionally given to measures in force on the frontiers, it has been made a matter of principle to go about the preventive measures inland as quietly as possible, with a view to avoid panic. In the eastern provinces of Germany and Austria the authorities are having the greatest difficulty in improving the state of the filthy towns in Galicia, where typhus epidemics have their home. Whilst in Berlin everything is now ready in case of an emergency, matters are not quite so well forward in Vienna, although even there the continual sanitary inspections render good service. As to Berlin, it would be well to note what great stress is laid on good scavenging, a matter almost neglected in Vienna; and as the cleanliness of the thoroughfares in the Prussian capital is generally good, it is now quite a pleasure to see the pavement of even the smallest by-street. Berlin is of course in every way better prepared to meet an epidemic, owing to the absence of all slums, its good drainage system and water supply, and last, but not least, the smoother kinds of paving. We have on a former occasion noticed that these every-day matters have not received proper attention in Vienna, points which will probably be sadly felt by the inhabitants in case of mishap. Speaking of the large cities farther east than Berlin and Vienna, *i.e.*, Breslau and Budapest, it is in the former in which a case of cholera *nostras* has already occurred, where an epidemic is most to be feared. The Hungarian capital, by the bye, can pride itself on having its sanitary condition on a far higher level than the not very dissimilar city of Warsaw, which latter place can, however, boast of a perfect drainage system.

NOW that the Judicial Committee of the Privy Council has approved both the form and the substance of the judgment of the Archbishop of Canterbury as to the Bishop of Lincoln's case, it may be well to note the important part which archaeological and artistic matter played in the judgment. If anyone will refer to the "Authorised Library Edition of the Bishop of Lincoln's Case," published by Messrs. Clowes & Sons, of Fleet-street and Charing-cross, and will cast his eye over the appendix to the Archbishop's judgment, in which are collected the various materials as to lights and the position of the altar, he will note how largely the Archbishop has drawn for his conclusion on various pictorial representations or archaeological data—as, for instance, those to be found in the publications of the Chetham Society, or, to take a particular instance, the woodcuts in Melancthon's "Forma Precationum." History, whether general or ecclesiastical, does not live only in books, and this case is an instance of the value of pictorial representation as an element of history. It is a mistake to think that the above publication has no interest for any except the clergy, and it should be placed at once on the shelves of the Library of the

Institute of Architects, if it is not there already, for it is likely to become a scarce publication.

THE Academy states that subscriptions amounting to 215*l.* are already promised towards the Lowell memorial. It is proposed to fill in with stained-glass the two windows in the vestibule, Westminster Chapter-house. Upon the completion, in 1873, of the late Sir Gilbert Scott's restoration, Dean Stanley entered into a project with the Government for filling in the windows, at an estimated cost of 6,000*l.* out of the National Exchequer, and Messrs. Clayton & Bell were entrusted to carry out the work. The late Dean got many fine words from successive Administrations, but a few weeks before his death (July, 1881) was informed that he could not have the money. Thereupon, from out of the surplus of the Stanley Memorial Fund, the smaller window above the entrance from the vestibule and two of the larger windows were filled in, and other windows were presented by the Queen and by some subscribers in the United States, in addition to one set up by Stanley and his friends. So one large window,—for which the design is already prepared,—and the vestibule lights, remain for the accomplishment of Dean Stanley's scheme.* It is appropriate that James Russell Lowell should thus be commemorated by Englishmen in our country, where, during his sojourn as Minister for the United States, he himself fitly played the leading part in the dedication of memorials to past literary worthies, including, in the Abbey, the busts to Coleridge and Longfellow, by Messrs. Hano Thornycroft, R.A., and T. Brock, R.A., respectively; and Sir A. W. Blomfield's monument, with a bust, to Pepps in St. Olave's, Hart-street, E.C. On November, 8, 1884, we published an engraving, executed by Mr. Cooper, of the Stanley monument set up in Henry VII.'s Chapel, at a cost of 2,100*l.*, its pedestal designed by Mr. J. L. Pearson, R.A., and the effigy executed by the late Sir Edgar Boehm, R.A.

IN avoiding one danger we are apt sometimes to incur another. The municipal authorities have for sanitary reasons, quite rightly, insisted that rain-pipes shall not discharge direct into the sewers, and that drain-pipes shall be ventilated by stack-pipes carried up to the roof. Mr. W. H. Preece pointed out last week, at the British Association meeting, that the former of these regulations, as usually carried out, deprived the house of a most efficient lightning-conductor, to the existence of which he mainly attributes the remarkable immunity of private houses from damage by lightning; while a metal stack-pipe, connected, perhaps, with an earthenware drain-pipe on the first-floor, would be a positive source of danger in a thunderstorm. Happily the remedy is easy; it is only needful to introduce a metallic connexion between these pipes and "earth," and they serve as well as ever as lightning-rods, without in any way contravening the new sanitary regulations.

DANBURY-PLACE, together with its park of 300 acres, on the road from Maldon to Chelmsford, was bought by the Ecclesiastical Commissioners in 1845, for 24,700*l.*, as a palace for the Bishops of Rochester. It stands on the site of a house built by Sir Walter Mildmay, of Ape-thorpe (*obit* 1589), and devised by him to his second son, Humphrey. In Thomas Wright's "Essex," 1855, we read that the former house had then been lately pulled down, and that Mrs. [sic] Round had designated its successor. It is stated that the Duke of Argyll is about to purchase the property as dowry, he being a connexion by marriage of the late Dr. Cloughton, for-

merly Bishop of St. Albans, who resided there, and the St. Albans Bishopric Act providing for a sale. The parish church and graveyard stand within the area of a reputedly Danish fort, situated on one of the loftiest hills in the county,—see a plan in Morant's "Essex," 1768. Danbury is scheduled in Domesday Survey as being held by Geoffrey de Mandeville, who had succeeded to all the lands held by Asgar, in virtue of the latter's office as King's Stalre, or Master of the Horse. Possessed in turn by the St. Cleres, the Veres Earls of Oxford, the Greys of Wilton, and the Lords D'Arcy, Danbury was given by Edward VI. to William Parr, Marquess of Northampton, who alienated it to Sir Walter Mildmay. In Bycknaere, a sub-manor, standing partly within this parish, Maurice FitzGeoffrey founded, *temp.* Henry II., a priory for black canons, which Sir Henry Mildmay bought in 1548. Views of the ruins, and of Daubury Place, are given in Wright's work.

IT is desirable that the case heard at the Marylebone Police-court this week in regard to the non-performance of sanitary work to a house after due notice should not be lost among the daily records of the Police-courts. The Vestry of St. Pancras ordered the defendant, the landlord of the house, to put the drains into repair, as they were in a very defective condition. Some work was done outside the house, but none inside. The defence of the landlord was that he had instructed a builder to do what was necessary; but the builder stated that he had done such work as he was ordered to do. The result was that the defendant was ordered to complete the work at once, and also to pay a fine of 5*l.* and costs. It cannot be too often repeated that the Public Health Acts and the Metropolitan Management Acts now give complete power to local bodies over landlords who neglect their duties in regard to a defective sanitary condition of their premises. This conviction will also serve as a useful object-lesson to persons who try to slur over work to save money. Thoroughness is the cheapest in the end.

PICTURESQUE Nuremberg has of late (says a correspondent) been greatly spoilt by the hideous erections put up by jerry builders or by so-called architects who like to see a cold, typical Renaissance façade placed next to some pretty piece of the old fortifications. The police authorities have now prohibited the further erection of these eyesores, and have published some regulations which will require architects or builders who may put up new façades to take the surroundings into consideration. As a rule, the style predominant in the city is to be used when designing future buildings, exceptions only being granted where it is impossible to combine these artistic requirements with the purpose of the new erection.

THE Standard last week announced that some articles have been accidentally dug up from a depth of 6 in. or 7 in. below the surface in Parliament Hill-fields, Highgate. They are described as comprising two "pilgrim's hottles" of foreign manufacture, about 300 years old; a silver cup of English make, about 200 years old; and two candle-holders, silver, weighing nearly 60 oz. in all. There, we surmise, may perhaps be the proceeds of a robbery, since the local history suggests little to connect the treasure-trove with the site, unless it had been left there by some of the "No Popery" rioters who gathered at the "Spaniards' Inn to attack Lord Mansfield's house in Coen Wood. Parliament, otherwise Traitors' Hill, takes its name, as some say, from an artillery battery fixed there during the Civil War; or, according to others, from the meeting there of Guy Fawkes's fellow-conspirators in order to witness the destruction of Parliament House. An eminence in the grounds belonging to Baroness Bardett-Coutts is also said to have

* See our illustrations of the vestibule and the great doorway, March 7 and 14, 1885, from Mr. Ernest C. Shearman's measured drawings.

been chosen for that purpose. The conspirators fled for refuge first to Caen Wood. The hill extends over 200 acres, and belonged until lately to Lord Mansfield. In 1884 a project was started for acquiring the land, together with the adjoining East Park Estate (sixty acres), owned by Sir Spencer Marjory Wilson, as an open space. An Act of 1886 enabled the late Metropolitan Board of Works to carry out the purchase, and on March 6, 1889, the sale, for 302,000*l.*, was finally ratified, the ratepayers contributing one-half of the money, and the Charity Commissioners 50,000*l.* Thus have been preserved the tumulus said to cover the slain in a battle between the inhabitants of London and a hand who had advanced through the northern forest from St. Albans; and the sources of the Fleet in a valley westwards of the hill. The High-gate ponds were made under a scheme of William Paterson (founder of the Bank of England), to collect the springs of Caen Wood as a water supply for northern London (1690); the Hampstead ponds were formed about the same time for a similar purpose as regards the City. The "upper" and "lower" ponds are cited among the copyholds of a terrier of Hampstead Manor, referred to by J. J. Park in his work upon Hampstead (1818) as "taken about the end of the seventeenth century."

AUSTRIAN architects, together with the civil engineers of that country, apparently wish to improve their status and to exert their influence in matters relating to technical training. They have sent a petition to the Government praying that certain examinations may be officially recognised, and, further, they have asked for votes in the election of the Principals of the Royal Technical College and the School of Mines. Among the minor points of the petition is the question of having technical *attachés* at various Legations, which has lately come to the front. That the requests are by no means the most modest will be seen when one reads that the number of *attachés* is to be seven, and that these representatives are not all to be stationed in modern capitals, but one of them in the East. The purport of the petition was framed with the sanction of the "Congress of Architects and Engineers," held last month.

A DISCUSSION on electrical units has become a regular feature of the British Association. In this matter there is "safety in numbers," and the divergence of opinion amongst reformers is the most hopeful sign for those who with Dr. Hopkinson "hope that electricians will be cautious in adopting new units, or altering old ones." Dr. Oliver Lodge's suggestions, though moderate and reasonable by comparison with those urged on him by Mr. Heaviside (in a letter recently published in *Nature*) are still open to criticism on several points. It would no doubt be convenient to have a proper name for the unit of magnetic flux, instead of the infinitesimal "line of force" which now occupies the field; but surely a better name might be found than the "weber," which not long ago was used for the present "ampere." We might even adopt Mr. Swinburne's suggestion, utilise the neglected Poggendorf, and call it the "pog." Most electricians, too, would far rather have to say "micro" a few thousand times more in their lives than have the system they are used to upset and their text-books and tables rendered obsolete by changing the microfarad into the farad. But by far the most objectionable proposal is to call the Board of Trade Unit a "kilowatt"; this is a distinct and avowed concession to ignorance and inaccuracy; it is as though we should bring out a new edition of Mrs. Shelley's romance with the name of Frankenstein transferred to the monster, or print in future editions of Pope

"A little knowledge is a dangerous thing" as a concession to persistent misquotation. Lastly, it hardly needs a resolution of

Section A to recognise the ampere-hour as a convenient unit of quantity, for it is generally so recognised already, and there is a charming absence of conventionality about the resolution, "That the handiest size for the gauss is one ampere-turn." On the whole, Lord Melbourne's oft-quoted question, "Why can't you let it alone?" is most pertinent to this discussion.

THE CAMBRIDGE CONGRESS OF THE ROYAL ARCHEOLOGICAL INSTITUTE.

THE opening meeting of the annual congress of the Royal Archaeological Institute of Great Britain and Ireland took place at the Guildhall, on Tuesday, the 9th inst. The building is a dreary, ugly-looking structure, reminding one rather of a suburban railway station than of the municipal buildings of a town like Cambridge. We sincerely hope the day is not far distant when a Guildhall worthy of the University town will be erected.

Punctually at noon, the Mayor, accompanied by Earl Percy, the President of the Institute, and followed by the members of the Corporation of Cambridge, the Vice-Chancellor of the University, and other distinguished gentlemen, filed into the reception-room of the Guildhall. The Mayor, on taking the chair, said a few words of welcome to his guests, and the Town Clerk read an address which expressed the great satisfaction of the Corporation that the Royal Archaeological Institute had honoured Cambridge with a visit. The Vice-Chancellor, on behalf of the University, and Professor E. C. Clark, on behalf of the Cambridge Antiquarian Society, spoke of the honour conferred on them by the visit of the archaeologists. Earl Percy, after expressing his thanks to the Municipal and University authorities for the hearty reception afforded to the members, commenced his address by referring to the immense advantage the two great English Universities had over those in any other country in the world. He spoke of the associations and invaluable records of both Cambridge and Oxford. Passing on to the work of local societies, he suggested they might do much by directing and encouraging those who, though often ignorant of archaeology, were yet willing to help in the repair of our monuments of the past. He thought they might also help in the direction of excursionists who visited their neighbourhoods. With regard to excavations, he strongly urged they should not be undertaken except under skilled and competent supervision, for improper digging into a tumulus or earthwork often destroyed evidence as to its origin and date. He concluded his address by suggesting a system of better concentration between the local and central societies in London. Perhaps some might consider this a rather Utopian idea, but he hoped to see it carried out.

At 2 p.m. the members met in the new Lecture-room of Physiology to hear Mr. J. W. Clark's opening address as President of the Architectural Section. The learned lecturer had prepared a large plan of what Cambridge was supposed to be before any colleges were founded. He then proceeded to place on the plan pieces of coloured paper, showing the dates and positions of the various collegiate buildings, thus making it perfectly easy for his audience to see at a glance how and when the colleges had been founded. The lecture was intended to serve as an introduction to the subsequent inspection of the town, and we can hardly imagine a better mode than that adopted by Mr. Clark. Later on in the afternoon Peterhouse, Little St. Mary's, Pembroke, Queen's, St. Catharine's, and Corpus Christi Colleges, and the Church of St. Benedict, were inspected under Mr. Clark's guidance. There was a general opinion among the members that the stained glass in Peterhouse was most unsatisfactory, and the Rev. Precentor Venables said the glass in question was of a style that ought always to be avoided. The contrast between the windows of Peterhouse chapel and the great east window of Little St. Mary's was remarkable. In the latter the colour and design were all that could be desired, and reflected great credit on the artist. Mr. Micklethwaite spoke at some length on the Saxon Tower of St. Benedict's Church, and Precentor Venables drew attention to the long-and-short-work at the east end of the nave, thus showing that the Saxon nave was the same length as the existing one.

In the evening Mr. E. M. Beloe read a paper on "Castle Rising," and Mr. E. Peacock communicated an interesting little account of the history of the custom of "Borough English."

On Wednesday, August 10, the members drove from Cambridge to inspect the Dykes on the road to Newmarket. These interesting earthworks were fully described by Professor E. C. Clark, who pointed out that both Balsham Dyke and the Devil's Ditch commenced in the woodlands and ended in the Fen country, thus making a perfect barrier against an invading force. The ditch in both cases was on the south-west side of the mound; he therefore concluded these earthworks were erected against an attack by an enemy from that quarter. Professor Clark also pointed out where the Roman-road, probably the Via Devana, crossed the Icknield Way. At Newmarket railway station the members left their carriages, and after luncheon, they proceeded by train to Bury St. Edmunds, where they were received by Mr. E. M. Dawing, who acted as an able guide to all the places of interest in the town.

In the evening the Bishop of Peterborough opened the Historical Section in the Guildhall.

On Thursday morning the usual business meeting of the members of the Institute was held in the Guildhall. Though the proceedings were entirely of a private nature, and only members were admitted, it soon became generally known that Earl Percy, who for nine years had so ably directed the business affairs of the Institute, had resigned the post of President. It is needless to state that a feeling of deep regret was prevalent among the members on account of the step his lordship had felt bound to take. Those who, under his Presidency, have joined in the annual excursions, will long remember the courtesy and kindness he manifested both to members and visitors, and the great interest he took in the proceedings. We understand that Viscount Dillon has been elected as his successor, and we feel sure the Institute will, under the guidance of so eminent an antiquary, continue in the good work it has so well executed in the past. It also transpired that the annual meeting next year would be held at Dublin. This decision of the members has met with great satisfaction, for though the name of the society is the "Royal Archaeological Institute of Great Britain and Ireland," no visit has yet been paid to the sister isle. It is proposed to hold the Jubilee Meeting of the Institute in London in 1894, and we understand that negotiations have already been opened with the various London authorities in respect of the projected gathering of archaeologists in the Metropolis.

Immediately after the conclusion of the business meeting, Mr. C. D. B. Fortnum opened the Antiquarian Section, and spoke at some length on the development of museums in this country. His address was followed by a learned paper on the Cambridgeshire Dykes, by Professor W. Ridgeway.

In the afternoon the members assembled within the gateway of King's College, and proceeded to the glorious chapel, which, perhaps not improperly, may be considered as the gem of Cambridge architecture. Sir George M. Humphry, in his "Guide to Cambridge," thus commences his description of the building:—"The Chapel, with its fine proportions, noble windows, gigantic but elegant buttresses, beautiful turrets, and boldly designed parapet, is truly a royal structure." The windows contain probably the finest specimens of glass painting in the country. Thankful must we be that they were not destroyed during the troubled times of the Civil War. They probably owe their preservation to the excellent terms that existed between the College authorities and the soldiers that were quartered there. Many of the members availed themselves of the opportunity afforded to them of mounting to the top of the chapel and there making an examination of the construction of the groined roof and of the timber roof above it. We do not here propose to enter into a detailed description of this College, or of the other buildings in Cambridge, for we are confident they are well known to the majority of our readers. Our business here is to record the proceedings of the Institute. After spending a considerable time in King's College, the members visited Clare College, Trinity Hall, and Trinity College. The party, as on the opening day, was under the direction of Mr. J. W. Clark.

In the evening a *conversazione* was held in the

Guildhall, the Mayor of Cambridge receiving the visitors. During the evening Professor E. C. Clark read an elaborate paper on "English Academic Costume." He commenced his discourse with a history of the rise of the university system, and traced out the origin of the various costumes of the college dignitaries, and the alterations that had been effected from time to time during the Mediaeval period. Not the least popular part of the entertainment was the selection of excellent music, arranged and performed by the Borough Organist, in the large ball.

On Friday, August 12, at 10 a.m., Mr. J. W. Clark met the members of St. John's College. One of the chief features of attraction here was the gallery, now used as a Combination room. In the hall is a portrait of Professor Palmer, who came to an untimely end in Egypt. He is dressed in Oriental costume. An amusing story is told about this picture. Some years ago an American, who had been "doing" Cambridge, greatly admired the portrait of the Professor, and was afterwards heard to say that the picture he liked most at St. John's College was that of "St. John the Baptist." Mr. Clark told the members that the library was without doubt the most beautiful room of its sort in the University. The book-cases are arranged according to the mediaeval custom, *i.e.*, projecting from the wall towards the centre of the room. At the end of each case is a catalogue of the books to be found there. Sir Christopher Wren was the first architect to upset this Mediaeval arrangement of libraries, and to place the bookcases against the walls of the room.

The Round Church, or Church of the Holy Sepulchre, was next visited. Mr. J. T. Micklethwaite said this was an excellent example of the exceedingly rare buildings known as round churches. Only four existed in England, although there are examples in other countries. Those in England are the Temple Church in London, and the Round Churches at Cambridge, Northampton, and Little Maplestead. These buildings did not necessarily owe their origin to the Knights Templars. The Cambridge and Northampton examples were decidedly parish churches. Mr. Micklethwaite said that the church in which they were then assembled had been the victim of early restoration. It had originally a fifteenth-century tower, which was remarkably picturesque. This was ruthlessly removed at the restoration. Precentor Venables said its removal had been requisite in order to save the substructure from ruin, but in this Mr. Micklethwaite did not agree. He said he did not blame the restorers of 1841; when the church was in their hands no doubt they had acted according to their lights, but he did blame those who, after fifty years of archaeological education, still persisted in the destructive policy. The painted glass in this church is most objectionable. The windows being small, and the colours of the darkest, the light is almost obliterated, and many of the beautiful details are not easily seen.

Jesus College was subsequently inspected, under Mr. J. W. Clark's able guidance. He said it was the only example in Cambridge of a religious house being transformed into a college. It has, therefore, several peculiar features. It is situate remote from the street, and the principal quadrangle is surrounded by cloisters. The building originally belonged to the Benedictine Nunnery of St. Radegund. In the latter part of the fifteenth century the religious house was dissolved, and Jesus College was founded on its site. John Alcock, Bishop of Ely, did considerable damage to the church by transforming it into a chapel in order to suit the new state of affairs. On leaving Jesus College, the party proceeded to Christ's. The Vice-Chancellor met the members at the private garden entrance, and took them past the swimming-bath, charmingly situated with many an overhanging tree, through the well-cared-for gardens to the College. It was founded in 1505 by Lady Margaret Beaufort. The hall was restored a few years ago, but all the original features were preserved. Mr. Clark called attention to the communication between the Master's lodge and the upper end of the hall, proving that the design was taken from that of the ancient manor-house, where the lord's entrance was always at the upper end of the hall. In the Combination-room the members were allowed to inspect the College plate, which an expert pronounced as the finest in Cambridge, and the University Library was next inspected, and

lastly, Gonville and Cains College, where the Gate of Honour was much admired. It was through this gateway the students passed when, having been successful in their examinations, they were about to take their degrees.

The afternoon was devoted to an excursion to Audley End and Saffron Walden. At the former place the party was received by the noble owner, Lord Braybrooke. On assembling in the great hall Mr. Longden read a paper by Mr. J. Alfred Gotch, who, unfortunately, was unable to be present. Audley End, grand as it is, is now only about a third of its original size. Formerly it was a palace, now it is only a magnificent mansion. It was built in 1614 by Thomas Howard, and is said to have taken thirteen years in erection. It is essentially of Jacobean character, and was designed by John Thorpe. For some years it was used as a royal palace. In 1721 the Earl of Suffolk, finding the place too expensive to keep up, demolished a large portion of the buildings. In the saloon are several fine portraits; the most remarkable are those of Lord Chancellor Audley, Margaret (his daughter), Henry VIII., Thomas fourth Duke of Norfolk, Thomas Earl of Suffolk, Queen Elizabeth, and Elizabeth, Countess of Portsmouth. In the library the mantelpiece is a good specimen of Jacobean work, and in an adjoining room is an interesting full-length portrait of George II. by Pirie. The museum was, however, the chief place of interest to the archaeologists. The only regret they had to express was that more time was not at their disposal to examine the interesting pre-historic remains contained in it. It would not be fair to conclude this short and imperfect account of Audley End without referring to the collection of natural history objects contained in the house. The ornithological department, we believe, is one of the most perfect collections of British birds in private hands. All the specimens are well-arranged, and deserve a close inspection by the visitor. The Institute owes a deep debt of gratitude to Lord Braybrooke for so kindly throwing his house open to its members.

Though many were unwilling to leave this interesting and historic place without further examining its treasures, yet they were obliged to hurry off at the appointed time to drive to the charming little town of Saffron Walden. If the antiquities of Saffron Walden are not of the highest order, they are certainly of sufficient interest to warrant an inspection by the Archaeological Institute. Moreover, no one would regret a visit to this little town, whose situation renders it one of the most picturesque places in Essex. The party was placed under a local antiquary, Mr. Edward Taylor, who acted as guide and conducted the visitors to the chief objects of interest in the town. The earthworks, known as the Repell Ditches, were first inspected. In a meadow adjoining, 150 skeletons were discovered in 1876. A short description of these interesting earthworks was made by Mr. Taylor. The party then inspected the exterior of an old house in Church-street, known as the Sun Inn. Little seems to be known about the history of the building. It is a long building with seven gables. In the centre is the date 1676; the whole of the upper portion of the house is covered with elaborate designs in plaster work. In one gable are plaster reliefs of two men, with a large round disc between them, supposed to represent the sun, the sign of the house when it was an inn in the olden days. Saffron Walden may be congratulated on its museum, which is arranged and cared for in the best manner possible. The curator, Mr. Maynard, conducted the visitors over the building, and pointed out the chief objects of archaeological interest. But it is not archaeology only that is represented here; the natural history collection is exceptionally rich in good and rare specimens, and the geological department is well worthy of a visit. We wish that other towns in England were as well provided with such excellent schools of instruction. In this respect we fear England is behind France, where almost every town of any importance has a museum. The church is a fine specimen of Perpendicular architecture, but has been too much restored to suit the taste of the antiquary. Some of the more energetic members also paid a visit to the Castle and the Maze, on which a paper prepared by the veteran antiquary, Mr. Joseph Clark, was read by Mr. Charleworth.

In the evening Mr. W. H. St. John Hope read a paper on "The Armorial Ensigns of the

University and Colleges of Cambridge," and the Rev. Dr. J. C. Cox read a paper on "Field Names and their Value, with a Proposal for their Systematic Registration."

Saturday, Aug. 13, was devoted to King's Lynn and Castle Rising. The members arrived at the former place about eleven o'clock, and were received at the railway station by Mr. E. M. Beloe, who conducted them to "Our Lady's Chapel on the Mount," a charming piece of architectural work, founded in 1483, for no other purpose than to receive offerings. The party next visited the central tower of the Grey Friars, the only portion of the building now remaining. It stands out well, and forms a striking feature in the town. Mr. Beloe reminded his visitors that in early times the trade of Lynn was very considerable, and one of the consequent results was the erection of its splendid buildings, notably the Churches of St. Margaret, founded 1100, and St. Nicholas, founded 1200. In the Town-hall were inspected the Corporation plate. The celebrated Lynn Cup was carefully examined by some of the experts. It is known as King John's Cup, but it certainly does not date further back than 1370. Mr. Beloe drew special attention to a book called the "Red Register," which he claimed to be the second oldest paper book in existence. It contains a register of early wills and notes of interesting events connected with the Corporation. The records of Lynn are intact from the year 1440 down to the present time. The charters, some of which were exhibited, date from the reign of King John. Some excellent rubbings of the Walsoken and Branche Brasses were exhibited and explained by Mr. E. M. Beloe, jun. After leaving the Town-hall, the party made a halt at the Custom-house, to allow of a short inspection of this interesting and picturesque building. At two p.m. the archaeologists started for Castle Rising, a pleasant drive of about five miles. The earthworks surrounding the Norman building are of considerable dimensions, and are probably Saxon in origin. Inside this inclosure may be seen the site of the ancient Saxon church. When the Normans arrived here, they built a church at the bottom of the hill, and the Saxon structure fell into disuse. Mr. W. H. St. John Hope fully described the castle and earthworks, and conducted the members over the buildings. An inspection was subsequently made of the Norman church of Castle Rising, after which the party returned to King's Lynn, where they were entertained at tea by Mr. and Mrs. Beloe, and in the evening returned by train to Cambridge.

The proceedings on Sunday were of the ordinary character, the official service being in the Church of St. Mary-the-Great, where a sermon was preached by the Rev. J. C. Cox, LL.D. In the afternoon, many of the members attended the service at King's College Chapel.

The members of the Institute who joined in the excursion on Monday last, the 15th, to see the Marshland churches, were indeed fortunate. The weather was all that could be desired to make a drive of some twenty miles from Wisbech to Lynn agreeable and pleasant. The scenery, though not romantic, is picturesque, and is rendered the more so by the many windmills dotted all over the landscape. In some cases these mills have six sails instead of the usual number. The churches visited are of the highest importance to the antiquary. One of the oldest members of the Institute, who has been a constant attendant at the annual meetings, said he never remembered visiting such a fine series of buildings.

Walsoken was the first halting place. The nave of its church is Norman; the aisles are of the same period, or probably a little later. Mr. Micklethwaite called attention to the existence of a "high side window" in the south-west corner of the nave. It is a small quatrefoil now blocked up. He said there was considerable divergence of opinion as to the use of these windows, but he considered they were merely intended to give light. The font was much admired, and was worthy of a more minute inspection than time allowed. Unfortunately, the party was obliged to hurry onward to make up time, as the train which brought them to Wisbech was nearly three-quarters of an hour late, and thus the arrangements for the day were somewhat upset. West Walton was the second of the series of churches on the agenda. The main part of the building is Early English. The aisles have at some period been widened to give greater accommodation, but this alteration

has not improved the appearance of the building. The old north door, however, has been preserved and re-erected in the wall of the widened aisle. On the south side of the nave is a very beautiful Early-English window, well worthy of special attention. No visitor will ever forget the splendid and massive tower, detached from the church, which acts as a gateway to the churchyard. Formerly there existed a strange peculiarity in this parish. Up to quite recent times there were always two rectors to the church.

After lunch at the schoolroom at Walpole St. Peter's, the church close by was inspected by the members of the Institute. It is of later date than the two previously visited, being a magnificent specimen of fourteenth-century work. One striking feature is the height of the communion table above the floor of the chancel. This is in consequence of a passage having been constructed under the east end of the chancel. The roof-screen, before it was destroyed, was unusually high, so as not to obstruct the view of the high altar. In the north porch is a stone boss with a representation of "Our Lady of Pity." Walpole St. Andrew's Church was next visited. Mr. Micklethwaite said that, though a much smaller church than the last, it was yet quite as interesting, chiefly on account of its fittings. There is a stone bracket on the south side of the chancel arch, on which originally was placed the pulpit. Mr. Micklethwaite said that there was no rule as to the proper place for the pulpit. It might be placed on either side of the chancel arch. Terrington St. Clements was the last of the Marshland churches visited by the members. It is, perhaps, the most beautiful of the series. The chancel is Early English, with Perpendicular windows. The nave arcade is Decorated, the transepts and crossing of the same period, but a little later, and the aisles belong to the Perpendicular era. After a thorough examination of this church, the party drove on to Kings Lynn, and returned thence by train to Cambridge.

The last excursion of the Institute was made on Tuesday, the 16th, to Ely. The Cathedral was inspected under the direction of Mr. W. H. St. John Hope. He commenced his lecture on the history of the building in the south transept, where a large plan was hung up showing what the cathedral originally was, then, by means of coloured plans superimposed, Mr. Hope was able to explain the gradual development that had taken place to the present time. The beautiful though dilapidated sculptures of the Lady Chapel were described by Mr. M. R. James. The subjects represent scenes from the life of and the miracles performed by the Blessed Virgin. In the afternoon the conventual buildings were visited, under the guidance of Mr. Hope and Archdeacon Chapman. Some of the members paid a visit to Mr. Fisher's museum, which contains a most interesting and valuable collection of prehistoric and Roman antiquities, chiefly found in the Fen country.

The concluding meeting was held in the evening in the Guildhall, where, under the presidency of Chancellor Ferguson, the usual votes of thanks were passed to the local authorities for the welcome afforded to the Institute during its stay in Cambridge.

We must not conclude this notice of the Institute's meeting without referring to Mr. N. C. Harcourt, LL.D., who devoted all his spare time towards making the meeting a success. His courtesy, kindness, and energy will ever be impressed on all who had the honour of making his acquaintance, and the members' thanks are chiefly due to him for the admirable manner in which the excursions were conducted.

THE ENGLISH IRON TRADE.—Quietness is still the prevailing characteristic of the English iron market, and that this unhappy state of affairs has not only been prevalent in recent months but has been general during the first half of the year is shown by the British Iron Trade Association. From these we learn that the production of pig-iron in the first six months of 1892 was 2,799,918 tons compared with 3,812,787 tons in the corresponding period of 1891, a decline of 921,469 tons. The consumption of crude-iron in the same epoch was 3,050,354 tons against 3,532,561 tons, or a diminution of 480,207 tons. The manufactured-iron trade is very dull; but tinplates are in somewhat better demand. The steel trade generally is not very brisk. Shipbuilders and engineers continue only moderately engaged. The coal trade is somewhat quiet.—Iron.

THE ARCHITECTURAL ASSOCIATION: TWENTY-THIRD ANNUAL EXCURSION.

THE headquarters of the Architectural Association for the present, their twenty-third, annual excursion, are at Taunton, a town more remarkable for its historical associations than for its existing architectural beauties, but nevertheless a good centre for visiting much of Somersetshire. Although this is the fourth excursion of the Architectural Association to Somerset, they do not appear, from their programme, to have yet exhausted the architectural interest of that county in their previous visits to Wells, Bath, and Yeovil.

As usual, the Sunday previous to the official commencement of the week's work gave an occasion of meeting to old friends, and a revival of the reminiscences of former happy times. Sunday not being part of the programme, members followed their own bent, and stayed quietly in Taunton, made short walking trips in the neighbourhood, or otherwise occupied themselves according to their individual bent. On the next day commenced the serious work of the week.

Monday.

The first day, fortunately, despite some showers on the previous evening, opened fine, and an excursion was made to various parishes close to Taunton.

The first halt was made at Bishop's Hall, where the Manor House, dated, as was seen from an inscription on the porch, 1586, was first inspected. The front, though without much elaborate detail, is a pleasing example of quiet and refined design, with projecting wings at each end of the façade, and a porch of slighter projection in the centre. The house was probably built by Sir George Farewell, who died in 1609, as is recorded on his tomb in the church. Internally there is little of special interest; one room on the upper floor possesses some good panelling, with a rather pleasing frieze of shields and conventional foliage between in flat carving. The house also retains a tradition of having been for a time the hiding-place of Monmouth after his disastrous insurrection, and the memory of Judge Jeffreys is also connected with some of the rooms. An example of the necessity some of the former owners were under of concealing, as far as possible, incriminating evidence may be noted in the form of a broken alabaster crucifix, which was found in the interior of a beam, and which, from the traces of rich colour and gilding still remaining, seems to have been of particular importance. The church has an octagonal tower of pleasing proportion, placed in a somewhat unusual position on the north side of the church; but as the building was probably altered about the same date as the erection of the manor house, or at any rate early in the same century, and was certainly enlarged in 1826, the precise arrangement of the original plan is doubtful. There are some fine examples of the carved bench-ends so frequent in this part of Somerset, and the monument to Sir George Farewell, already mentioned, besides others to members of the same family.

Trull Church was next visited; it is remarkable for the rich character of its carving in bench-ends, screens, and pulpit, and for the exceptionally perfect stained glass in the chancel windows. Of these latter the east window has paintings of the Crucifixion, with the Virgin and St. John on either side; while the south window, which is, if anything, superior in design and colouring, shows figures of St. Michael, St. Margaret, and St. George. The date of the carving, and probably of the church, may be learnt from an inscription on one of the bench-ends: "Simon Warman, maker of this work, A. D. 1560. John Waye, Clarke here." Warman's work shows that he must have been a man of remarkable fertility of invention and boldness in craftsmanship, not quite equalled by technical skill, as the carving, though extremely vigorous, is deficient in delicacy and finish. The pulpit is a very fine example, with boldly-carved figures of St. John and the four great Doctors of the Roman Church. The church possesses north and south aisles to both chancel and nave, and a western tower with six bells.

Poundisford Hall, the next stopping-place, has lost much of its interest from the addition of stucco externally and of modern improvements internally. The hall has a good plaster ceiling, with ribs in geometrical arrangement, and somewhat heavy

pendants. There are in many of the rooms richly-modelled plaster friezes, but these have entirely lost their sharpness and much of their detail from repeated applications of whitewash laid on without due regard to the preliminary washing-out of former coats. A very fine rain-water butt of cast lead, with ornamental panels, showing mermaids combing their tresses, conventional foliage, and bearing date 1671, stands in front of the house. The frieze of this water-butt is interesting, representing scenes in an apple orchard, which suggests that it may have been used for cider making, though the position in which it now stands seems to be the original one, and so negatives the suggestion. There are several summer-houses in the grounds which are remarkably picturesque.

Two churches were next visited, the first being Ruishiton, which has a fine tower, though somewhat low in proportions, of a type not uncommon in the vicinity of Taunton. This has coped windows in the belfry stage, most of which are filled with pierced tracery, and in the stage below a single blank window of similar form to those above. At the eastern end of the north side of the tower, which, by the way, is at the west end of the church, is a semi-octagonal turret,—a not uncommon feature in this locality. Another feature also often found in these churches is the pinnacle set diagonally on the upper part of a rectangular buttress. Internally there is not much of interest. The church consists merely of a nave and chancel, with a chantry chapel on the south side of the nave, having a double hagioscope to the chancel. There is also evidence of the former stair to the roof-loft, though all other trace of the screen is lost. An Early Decorated window, inserted at the east end of the chantry mentioned, seems to show that an earlier church preceded the present Late Perpendicular structure. Over the altar is an old painting, evidently Flemish, representing the Adoration of the Magi, and some Flemish tracery panelling is further used as a screen to the east end.

Creech St. Michael, the last church visited on the first day, is a comparatively large church, rebuilt apparently in the sixteenth century, as the lower part of the tower and one bay of the arcade eastward, as well as the disused south doorway, are clearly of thirteenth century date. Many of the arches internally have copied niches for figures, and over the west window, there exist, in a well-designed niche, the remains of sculpture representing The Father supporting the Crucified One, and therefore forming part in all probability of a not uncommon representation of The Trinity in late pre-Reformation times. A number of well-carved bench-ends of good design have in quite recent times been adapted for the choir seats and other church furniture.

Tuesday.

On the second day the district visited was at some little distance from Taunton, and train was therefore taken to Minehead station, from which carriages conveyed the members to the church of Minehead, and thence to Dunster, Cleve Abbey, and St. Decuman's Church, near Watchet, from which station the rail was again taken back to the head-quarters at Taunton. The morning was unfortunately wet, a meteorological phenomenon usually expected on the Association excursion, but the latter part of the day was as fine as anyone could wish.

Minehead has some points in its history which are interesting. At the time of the Conquest it was called Manhed, and was bestowed by William upon his follower, William de Mohan, but does not appear to have been in a fortunate position, exposed as it was to the predatory incursions of the Danes on the one side, and dominated by the powerful strongbold on the other. In 1642, it is true, it formed the base of operations by the cavaliers in their attacks on Dunster Castle. "Amongst the curiosities of Minehead is the Cow Charity." By an Act of Parliament passed in the 18th of Charles II, it was enacted that the importation of cattle into Minehead should be considered a nuisance after February 1, 1666, and that they should be forfeited, half the value to be applied to the use of the poor and the other half to be given to the captors. A certain capture having been made, the moiety was laid out in the purchase of an estate, the rental of which, amounting to about 30*l.* per annum, together with the interest of 1,197*l.* 5*s.* 7*d.* Three per Cent. Consols, arising from unappropriated accumu-

lation of income, is distributed annually among the poor in money and clothing. This charity is called the "Cow Charity." A species of fish is found at low water on the locks of Minehead, which affords a peculiar find, having the property of communicating to linen a purple tint, supposed to be similar to the *murex* which produced the Tyrian purple mentioned by Pliny.

The celebrated lawyer Henry de Bracton is said to have been born at Bratton Court, an old mansion here. Over the principal gateway which remains is a room called the Judge's Chamber, traditionally reported to have been his study, but the building is of a later period than the age in which he lived. Dr. Brocklesby, the friend of Johnson and Burke, distinguished as a physician and medical writer, was likewise a native of Minehead.

The church possesses one of the finest screens in Somerset, the carving being particularly delicate in execution as well as vigorous and resourceful in design. The stairs to the roof-loft still exist in perfect preservation on the south side of the church, and the turret in which they are enclosed forms a picturesque feature on the exterior. A good canopied monument on the north side of the chancel is said to be that of Bracton, the famous lawyer already alluded to, but is evidently of much later date, and the tomb of a priest, from the chalice which he holds and the vestments he wears. The font is octagonal, and richly decorated with figures of apostles and saints.

From Minehead a drive through beautiful scenery takes one to Dunster. Although remains have been found which prove Roman occupation, the town, which is called Torra in the Doomsday Book, owes its origin to a baronial castle built here by William de Mohun, a Norman baron, on whom William the Conqueror bestowed large estates in this part of the kingdom. He also founded a priory of Benedictine monks as a dependency to the abbey at Bath, the revenue of which at the Dissolution was 37l. 4s. 9d. In the deed of gift conveying the property to the Abbot of St. Peter's at Bath the name Dunestora is used. The castle, which was held by the family of Mohun till the reign of Edward III., was the scene of hostilities during the civil wars which took place in the reigns of Stephen and John, and in the contests between the houses of York and Lancaster; and the Marquis of Herford took possession of it for Charles I. during the war with the Parliament. The castle has been the residence of the family of Luttrell since the time of Edward III.

The castle still remains in the possession of the Luttrells, and though the interior has been much modernised, and additions made under the direction of Salvin about the year 1867, it still retains much of its interest and character. As might be expected from an ancestral home of so old a family, many examples of old furniture and decoration are to be seen in the interior. One of the most interesting of these is the series of splendidly-executed paintings on leather, representing principally scenes in the story of Antony and Cleopatra. These serve as wall-hangings in lieu of tapestry, and from the costumes are evidently of the date of Charles II.'s reign, and are said to be of Italian workmanship. Very few examples of this class of work exist even in Italy, at least of so much importance and completeness. The staircase is adorned with an elaborately-carved balustrade of the date 1681, when various improvements were carried out by the then owner, Francis Luttrell.

In the small town of Dunster, which lies at the foot of the hill on which stands the castle, there are some picturesque buildings, amongst which the Yarn Market, an ancient picturesque structure of wood, from its position is, perhaps, the most striking. (We give a view of this on a preceding page.) It was built about A.D. 1600, when the Dunster manufacture of woollen "kerseymeres" was of importance, and was repaired in 1647. The "Luttrell Arms" Hotel has several parts remaining of sixteenth-century date, with some ornamental work in the form of chimney-pieces and ceilings of the succeeding century.

A picturesque building called "The Nunnery," reminds one of Normandy and Brittany, with its overhanging stories sheathed in slate, which seems to have been superimposed on half-timber work.

The church, probably erected about 1419 A.D., is said to have been built by Henry VII. in acknowledgment of the assistance afforded him

by the men of Dunster in the Battle of Bosworth Field. It consists of a nave, aisles, and chancel, with a central tower ornamented with embattlements and pinnacles, beyond which to the east is a kind of Lady Chapel, formerly the monastic church of the priory. This part of the building was also used by the incumbent of the parish for the performance of divine service until the year 1499, when a dispute arising between the monks and the parishioners the matter was referred to the Abbot of Glastonbury, who decided that the latter should have a choir separate from that of the monastery.

The church contains many fine sepulchral monuments belonging to the families of Mohun and Luttrell, and has been pretty thoroughly restored under Street. The screens are similar in character and excellence to those at Minehead, and show evidence of having been designed and executed by the same hand. Some few remains of the monastic buildings, besides the rather apocryphal "Nunnery" already alluded to, may be seen in the neighbourhood of the church, the great harm being the most noticeable.

From Dunster the members of the party proceeded to Cleve, a perfect paradise for water-colour sketchers.

Cleve Abbey was an offshoot from the Cistercian Abbey of Revesby in Lincolnshire, and seems to have been established by the joint founder of both monasteries, William de Romara, in 1188. Thus we have here an example of the Cistercian practice of establishing distinct abbeys as offshoots from older institutions, instead of the more dependent priories favoured by other monastic orders. Some of the remaining buildings undoubtedly formed part of the original church and monastery founded by William de Romara. The dormitory is one of the most perfect examples of monastic times, and dates amongst the earliest parts of the Abbey, although it has been altered probably in the time of the last Abbot, William Dovel, in the fifteenth century, as he seems to have made considerable alterations, building a new refectory, in the unusual arrangement for Cistercian monasteries, parallel to the cloister, instead of at right angles to it, as was the situation of the older refectory here.

The roof is an excellent example of early hammer-beam type, in very good preservation. At the east end may be distinguished the remains of fresco painting as well as in the abbot's lodging.

The other parts of the abbey in the best preservation are naturally also part of Dovel's work, including the south wall of the cloister and the gatehouse to the Abbey precincts. Of the church nothing remains but the foundations, from which, however, the plan can be made out, and the basis of some of the circular piers as well as the fragments of floor-wings show it to have been of Transitional date.

From Cleve Abbey the excursionists drove on to St. Decuman's, so-called from its patron saint Decombes or Decumanus, who, landing from South Wales and finding a perfect wilderness, fixed upon this spot, in order to seclude himself from the rest of the world. Having been murdered, he was canonised in due course. The church, with the exception of the east window, is of Late Perpendicular work, with a lofty tower at the west end. Several of the nave piers still retain their canopied figures of St. Decuman, St. George, and other saints. The figure of St. Decuman may also be seen on the external south face of the tower. There is some good carved woodwork in the screens, though these are not equal to those at Minehead and Dunster, but the roofs have exceptionally good cornices and winged figures of the various orders of angels. There are some excellent brasses to the memory of the Wyndham family, one with raised figures,—a style of work not usual in England, though frequently found in Germany. The pulpit with its canopy are fair examples of Jacobean work, and the altar rail also dates from the same period.

At St. Decuman's concluded the "second day's work of the party."

We will continue our account of the excursion next week, with additional illustrations.

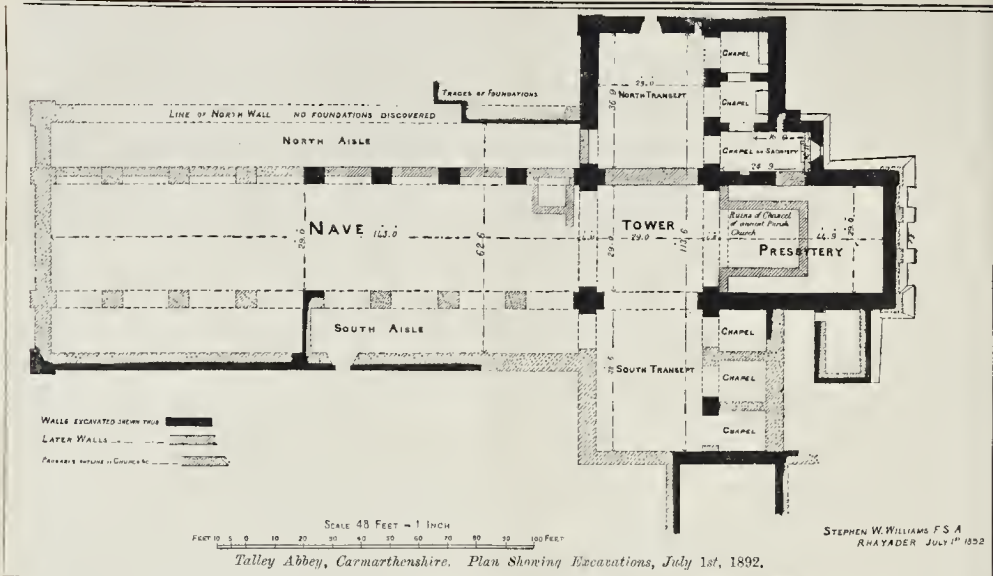
BOARD SCHOOLS, LANELLY.—We understand that the Lanely School Board have instructed their architect, Mr. J. B. Morgan, to prepare plans of a school for the Dock district, to accommodate 300 children; also for a school for Machynis for 200 children.

DEFECTS IN SANITARY ENACTMENTS.

IN opening a discussion at the Town Hall, Falmouth, recently, before the Western Branch Sanitary Inspectors' Association, on "Some Defects and Suggested Improvements in the Sanitary Enactments," Mr. A. J. Moss Flower, C.E., said the subject under discussion was a very important one, for sanitary enactments meant something relating to health which had passed into law. We had the precedents of past centuries to show that the physique and hearing of a people, and the death rate and sick roll had varied in accordance with the attention that had been paid to the laws of sanitation. It must be obvious that disease began where resistance ended, and that resistance was always impotent where vital force was destroyed. Sanitation aimed to increase the power of resistance; it made the strong stronger, lessened the weakness of the already weak, and assisted in the provision of healthy dwellings, good drainage, water, and air. Enactments that assisted in these objects would always be valued by right-minded people, and the man who would benefit his countrymen could not do so in a more noble and useful manner than by framing good, sound, workable sanitary laws that could be carried out in their entirety, and getting them successfully passed through the Houses of Parliament. Mr. Flower then proceeded to discuss some defects in the various sanitary enactments, chiefly those relating to the duties of sanitary inspectors, their designation, tenure of office, and salaries. He said there were so many small enactments as to cause much confusion, and that this should be remedied by the passing of one Act dealing with the Public Health expressed in plain, simple language with very many of the permissive clauses removed. *Shall* should be substituted for *may*, so often used, as for example in matters specified in section 157 of the Public Health Act, 1875. Where urban authorities "may" make bye-laws, it should read urban authorities "shall" make bye-laws, and other sanitary authorities too, because it was of great importance to all that the detailed sanitary arrangements in towns and villages should be as perfect as possible, and that could only be arrived at by local authorities exacting a due compliance with a satisfactory set of bye-laws. He thought it very desirable that a uniform set of bye-laws should be drawn up by the central authority in respect to those matters referred to in Section 157 of the Public Health Act, 1875, and it should be enacted that every local authority "shall" adopt such bye-laws with such modifications as the central authority may deem fit, after receiving the evidence in favour of the required modification. In the drawing-up of these bye-laws he would invite local surveyors and others continually dealing with these matters to express an opinion in writing to the central authority, stating what they thought was required, and he ventured to think that a set of bye-laws might be arranged to meet all circumstances without being arbitrary. The speaker then touched on several defects in existing legislation, and concluded by saying that, in his opinion, sanitary officials should be responsible to a central authority, who only should have the power to remove them on just cause being shown. Although he had only mentioned upon a few defects, many more led up from them. He urged upon members of County Councils, Sanitary Authorities, Sanitary Officials, and, in fact, all who had an interest in the public health,—and surely all must have, if they had the welfare of their country at heart,—to earnestly push forward and agitate for the appointment of a Minister of Health to guide and direct sanitation in all its departments.

MESSRS. REED, BLIGHT, & CO. (LIMITED), contractors, Plymouth, have opened offices at Albany-buildings, 47, Victoria street, Westminster, S.W.

NEW DRY DOCK AT JARROW.—The Mercantile Dry Dock Company, Jarrow, opened at Jarrow, on the 4th inst., a new dock, to be known as "No. 2 Dry Dock." The new dock is situated on the high side of the old dock, about four hundred yards or more below Palmer's works. The contract for the making of the dock was let to Mr. J. Best, of Edinburgh, and the engineer of the works is Mr. James Watts Sandeman, of Newcastle. The following are the principal dimensions of the dock:—Clear length on floor, 350 ft.; width at top, 72 ft.; width on floor level, 49 ft.; width of entrance, 50 ft.; depth of entrance below eops level, 24 ft. 9 in.; depth of water on sill, 21 ft.



Talley Abbey, Carmarthenshire. Plan Showing Excavations, July 1st, 1892.

Illustrations.

ARCHITECTURAL ASSOCIATION EXCURSION: PLACES VISITED.

THE illustrations of Somersetshire given in the present issue include some of the principal buildings in Taunton and its neighbourhood visited by the Architectural Association during their annual excursion. They should be taken in connexion with our leading article and the report of the proceedings which will be found in this number. We shall continue our report next week, together with some further illustrations of places of interest.

The photographs of the churches of St. Mary's, Taunton, St. James's, Taunton, and Kingston St. Mary, are by Mr. H. M. Cooper, of Taunton; those of Bishops Lydeard and Creech St. Michael and Buishton by Mr. Frith.

THE CAMBRIAN ARCHEOLOGICAL ASSOCIATION AT LLANDEILO.

BEFORE continuing our report* of the proceedings of this Conference, we may refer the reader to last week's *Builder* for the account of the excavations at Talley Abbey, of which we are now able to give a plan, as well as a small view of the remains as they appear. For the loan of these and other illustrations to this report (which are all taken from the *Archeologia Cambrensis*) we are indebted to the Committee of the Cambrian Archaeological Association.

On Wednesday, the 10th inst., the proceedings commenced with an examination of Llandello Parish Church, the ground-plan of which, consisting of a nave and chancel, with nave aisles and chancel aisles on the south, but none on the north, and a western tower, is typical of nearly all the others in this district. Restorers (in this particular case the late Sir Gilbert Scott) have succeeded in removing almost every trace of interest the buildings may have once possessed. The character of the towers has not been materially altered, but the substitution of modern tracery in all the windows must always be a matter of regret to lovers of ancient ecclesiastical architecture. An inscribed stone formerly existed at Llandello, which may have been of the time of St. Teilo, the patron Saint. Unfortunately, it appears to have been completely lost. The only record of its existence is in a note made by the well-known antiquary, Edward Lhwyd, in 1697. There are, however, preserved within the church two heads of wheel crosses (one of which is elaborately ornamented with interlaced work) of the ninth or tenth century.

* See last week's *Builder*, p. 125.



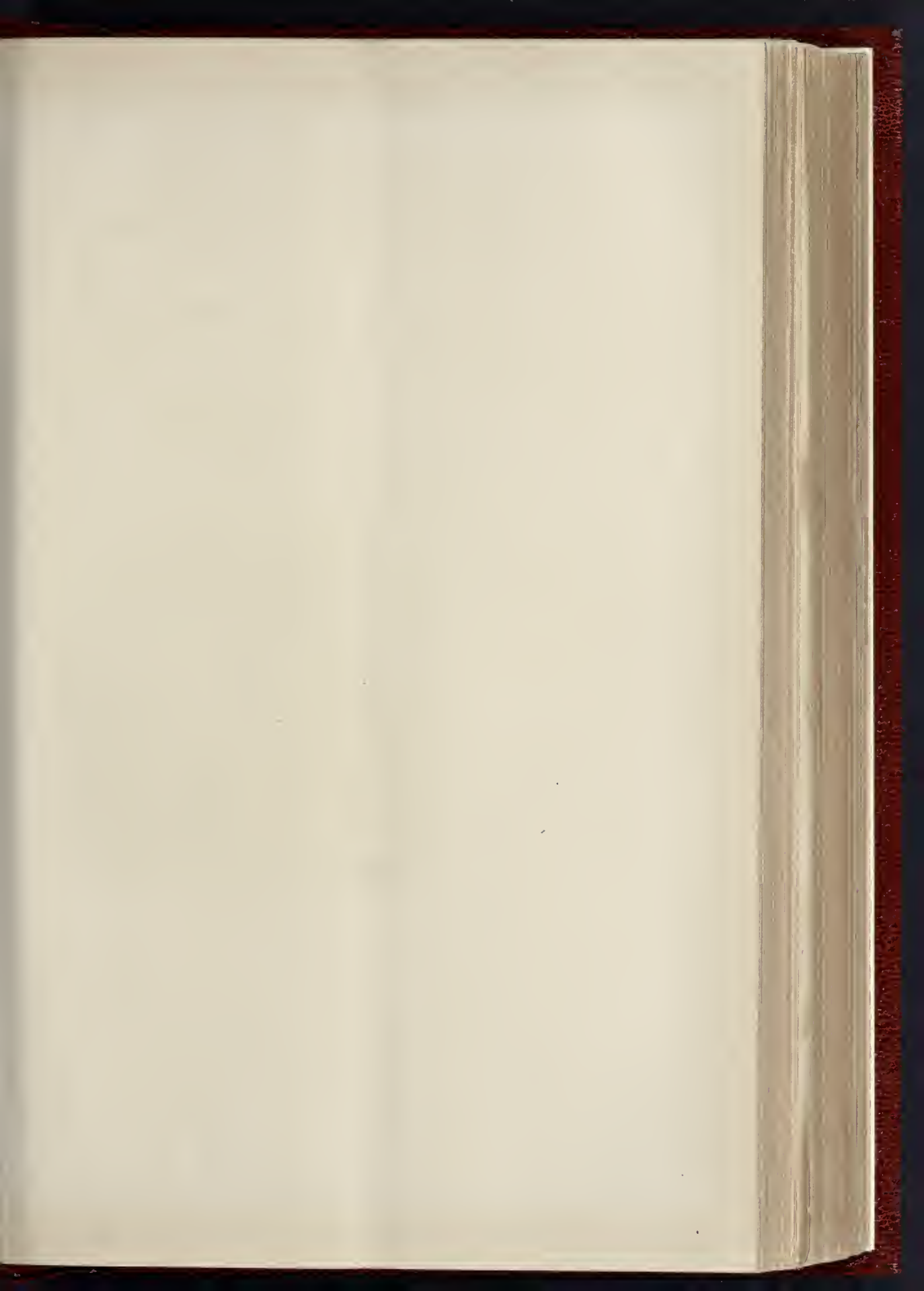
Remains of Talley Abbey.

At ten o'clock the carriages were ready to convey the party to Dynevor, visiting on the way the little church of Llandelsant, close to Llandello, which possesses hardly any points of interest to detain the archaeologist. Mr. Penrose, the great authority on the optical refinements of Greek architecture, formed one of the party, and his trained eye was at once struck by the extraordinary jumble of mouldings of the thirteenth and fifteenth centuries which the restored western doorway exhibits.

A short drive brought the members to the modern mansion of Dynevor, a building erected in execrable taste, and forming a marked contrast to the exquisite demesne in which it is situated. The ancient castle of Dynevor occupies a strong position on the north bank of the river Towy, nearly a mile south of the house. The park surrounding it is well wooded, and its forest glades may fairly be compared with those of Windsor. The view of the castle across the green lawns, that have taken centuries to mature, is as fine as

anything in the whole of Wales. The principal feature in the ruins is a drum tower of large dimensions, not unlike the one at Penrhoke, but somewhat smaller. The over-sailing corbel course, although a simple form of decoration, is used with as good an effect here as in the towers of the churches. Neither the history nor the architecture of Dynevor Castle has been investigated by any competent person, although it was in medieval times one of the most important fortresses in the Principality. The most ancient part of the present structure does not date back beyond the thirteenth century.

Proceeding two miles further westward along the north bank of the Towy, the church of Llangathen was reached. It has a good tower, and contains a fine monument in the Renaissance style to Antony Ridd, Bishop of St. David's (who died in 1614), erected by his wife, Anna Dalton, two years after his decease. The next place on the programme was Cart Henry, where, if tradition is to be believed,





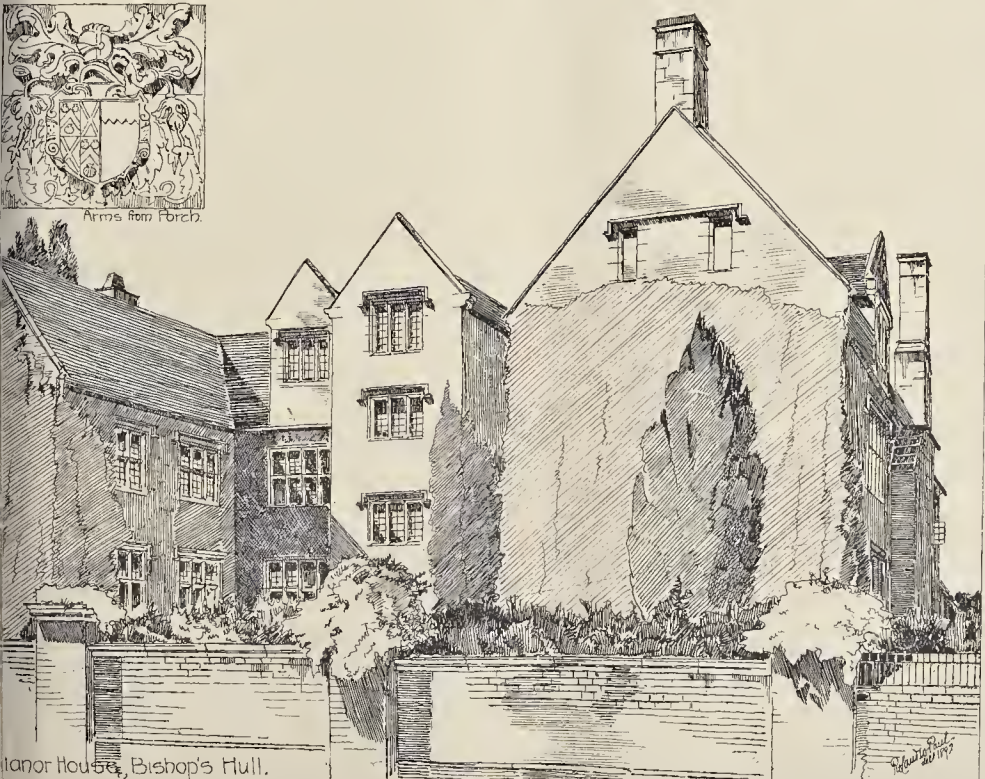
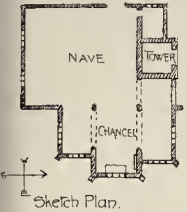
Palmer & Paul
1872

Manor House
East Quantockhead
View from N.W.



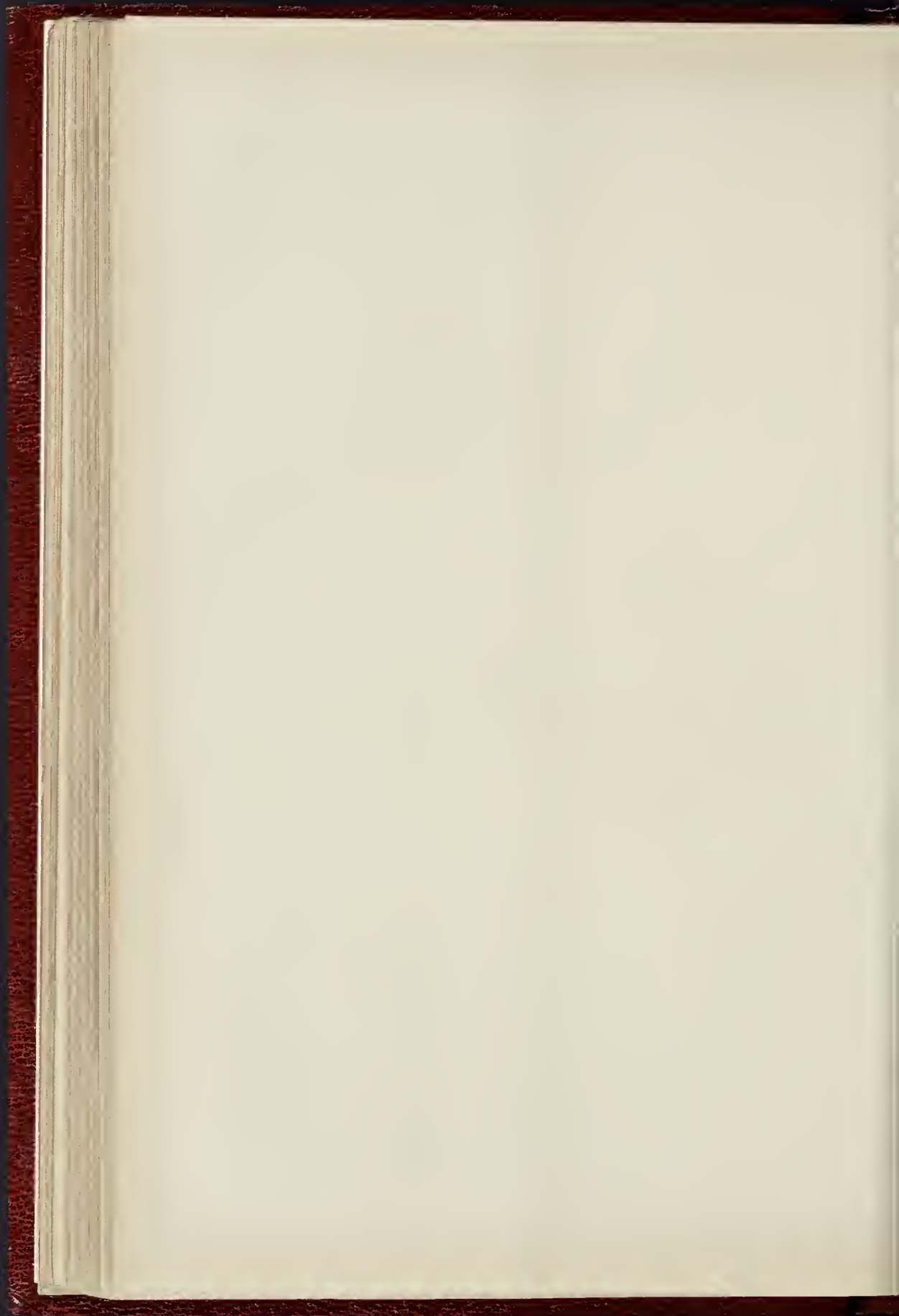
Manor House
East Quantockhead
Front View

The Church, Bishop's Hull.



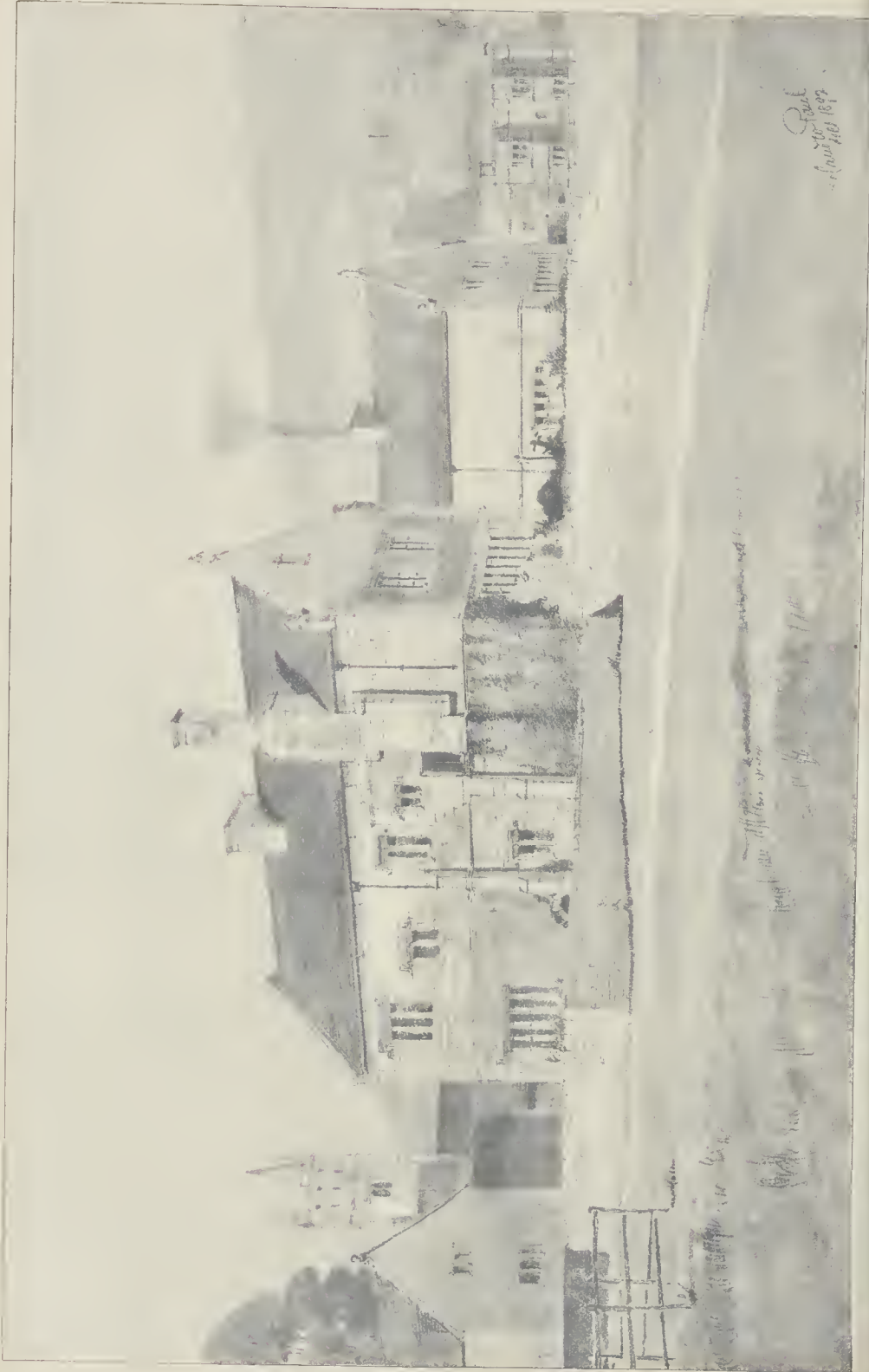
Manor House, Bishop's Hull.

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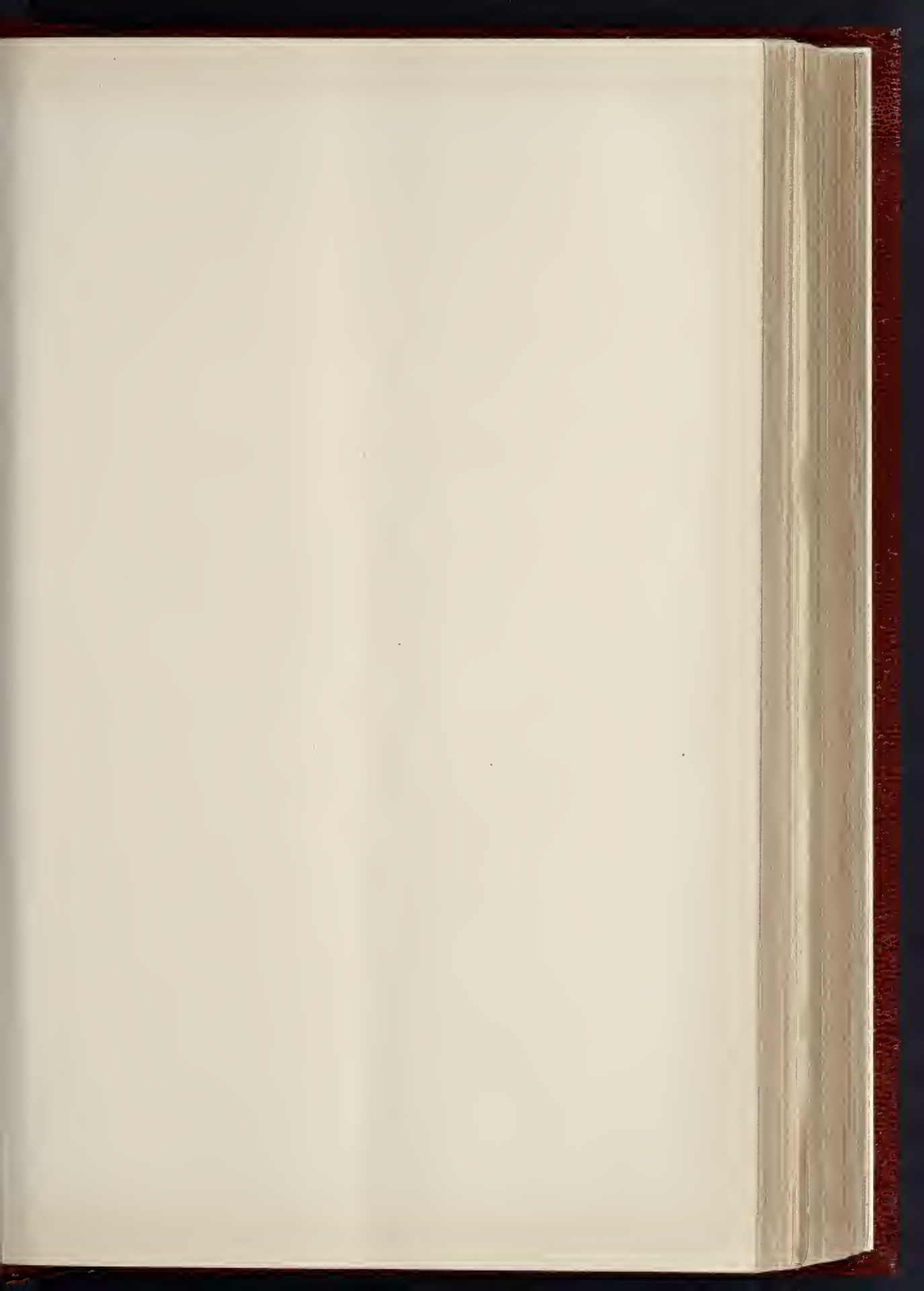


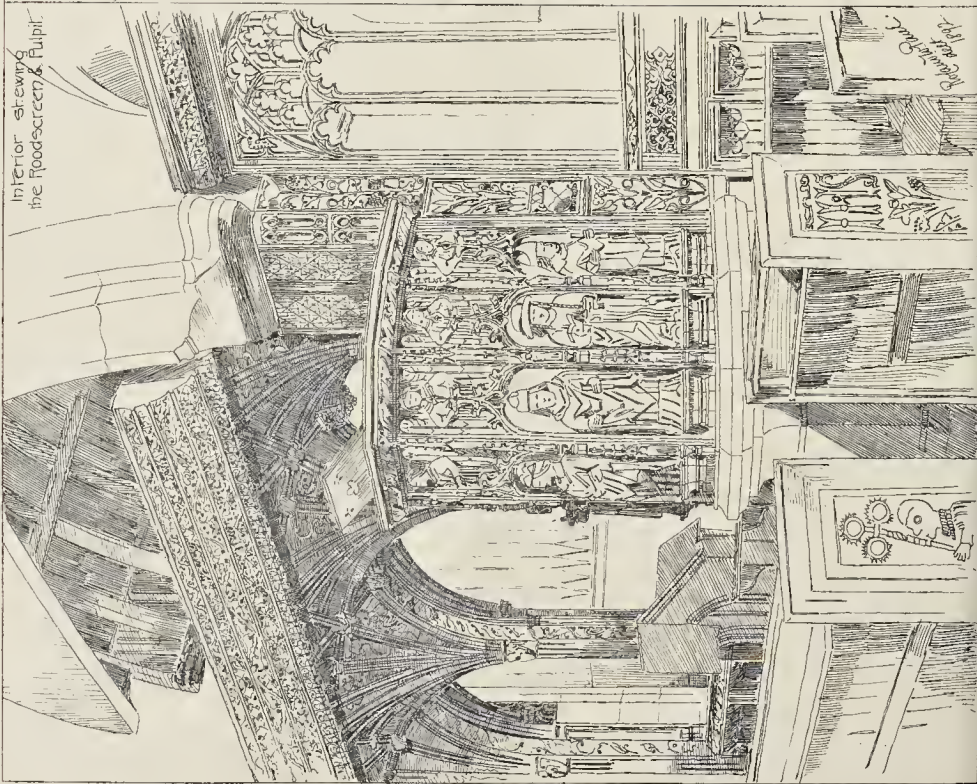


THE BUILDER, AUGUST 20, 1892.

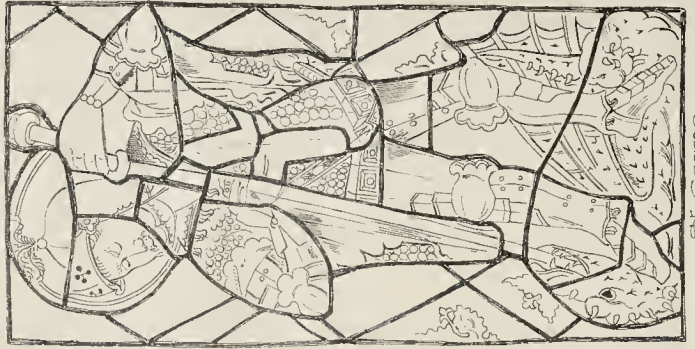
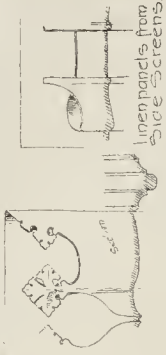
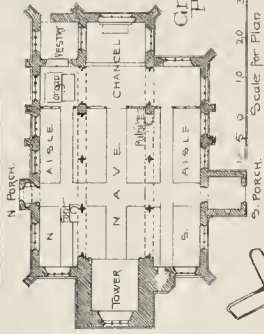


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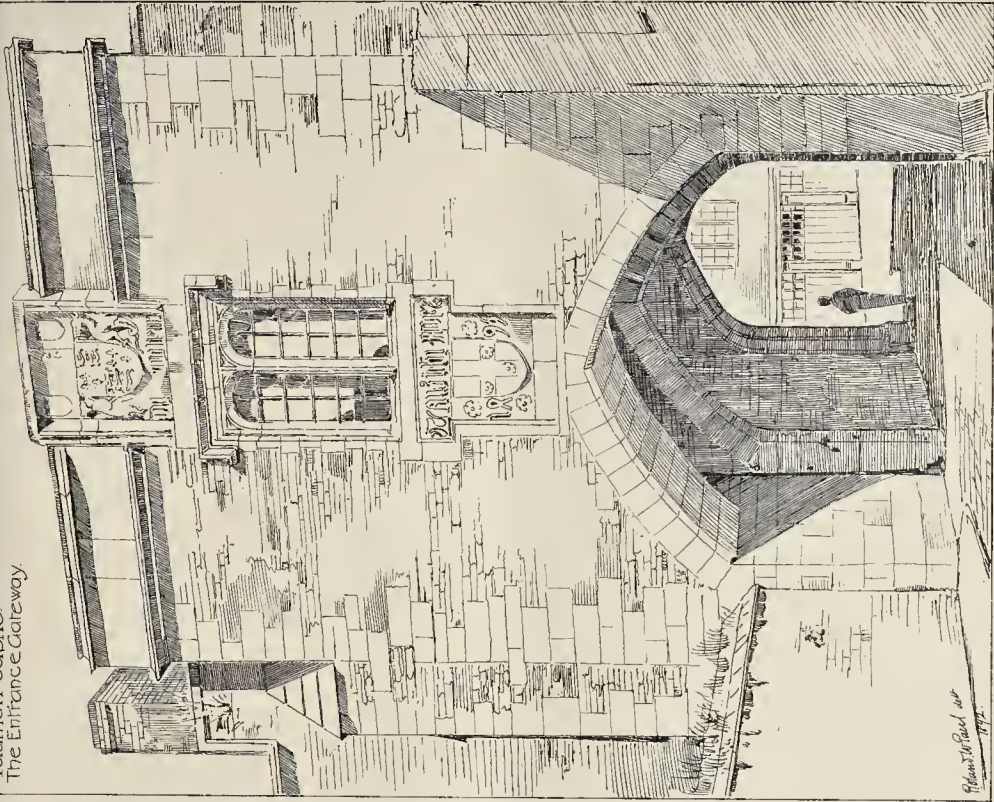




Trull Church, Somerset.

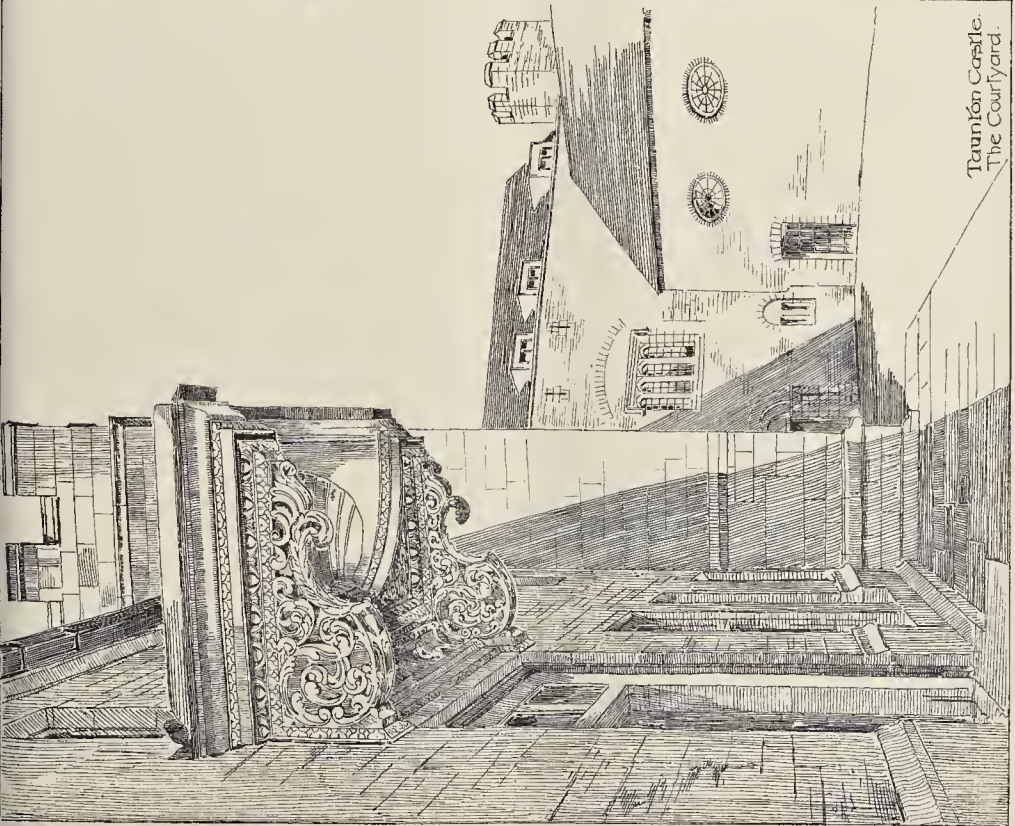


Taunton Castle.
The Entrance Gateway.

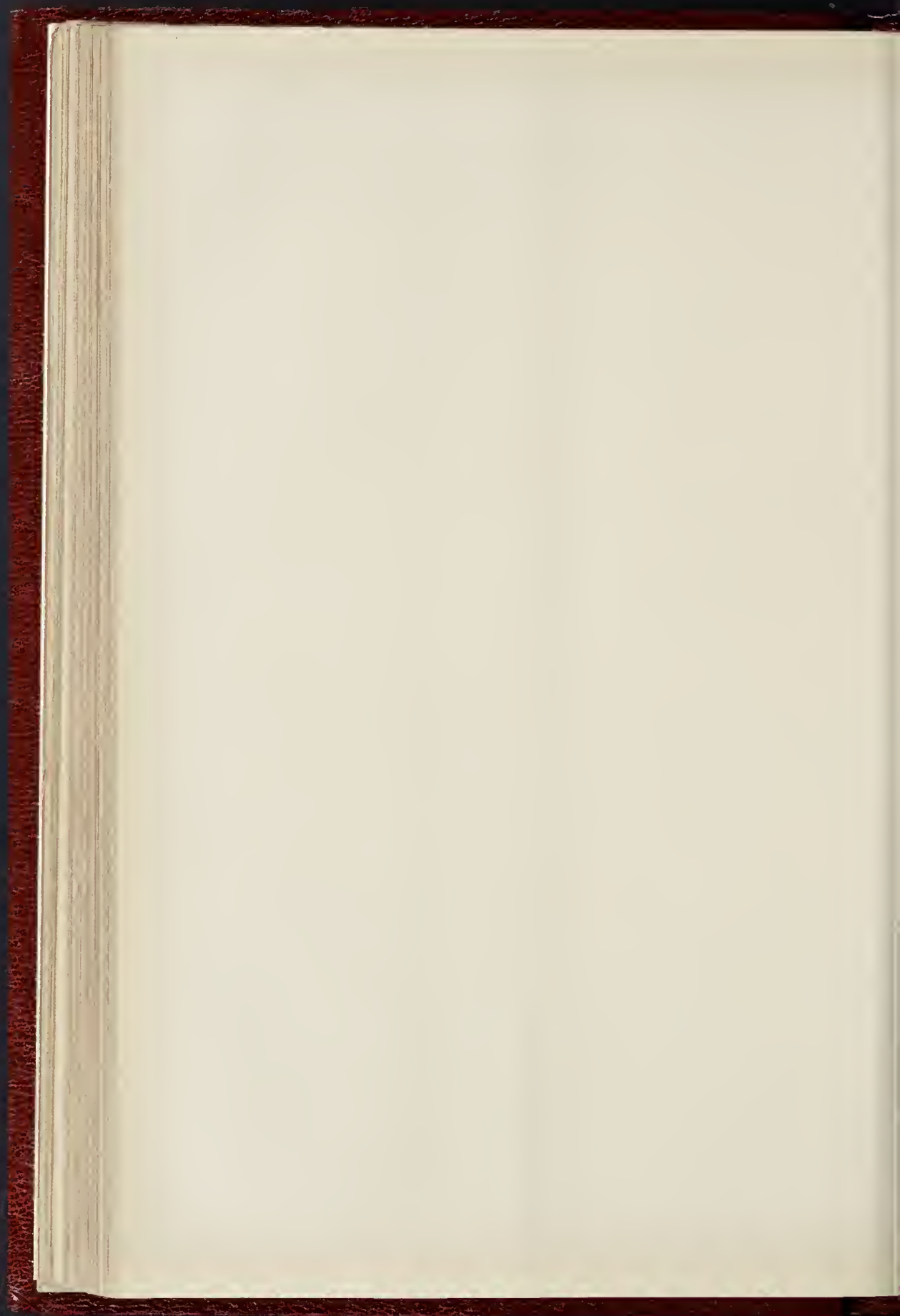


Planned by the author, 1892.

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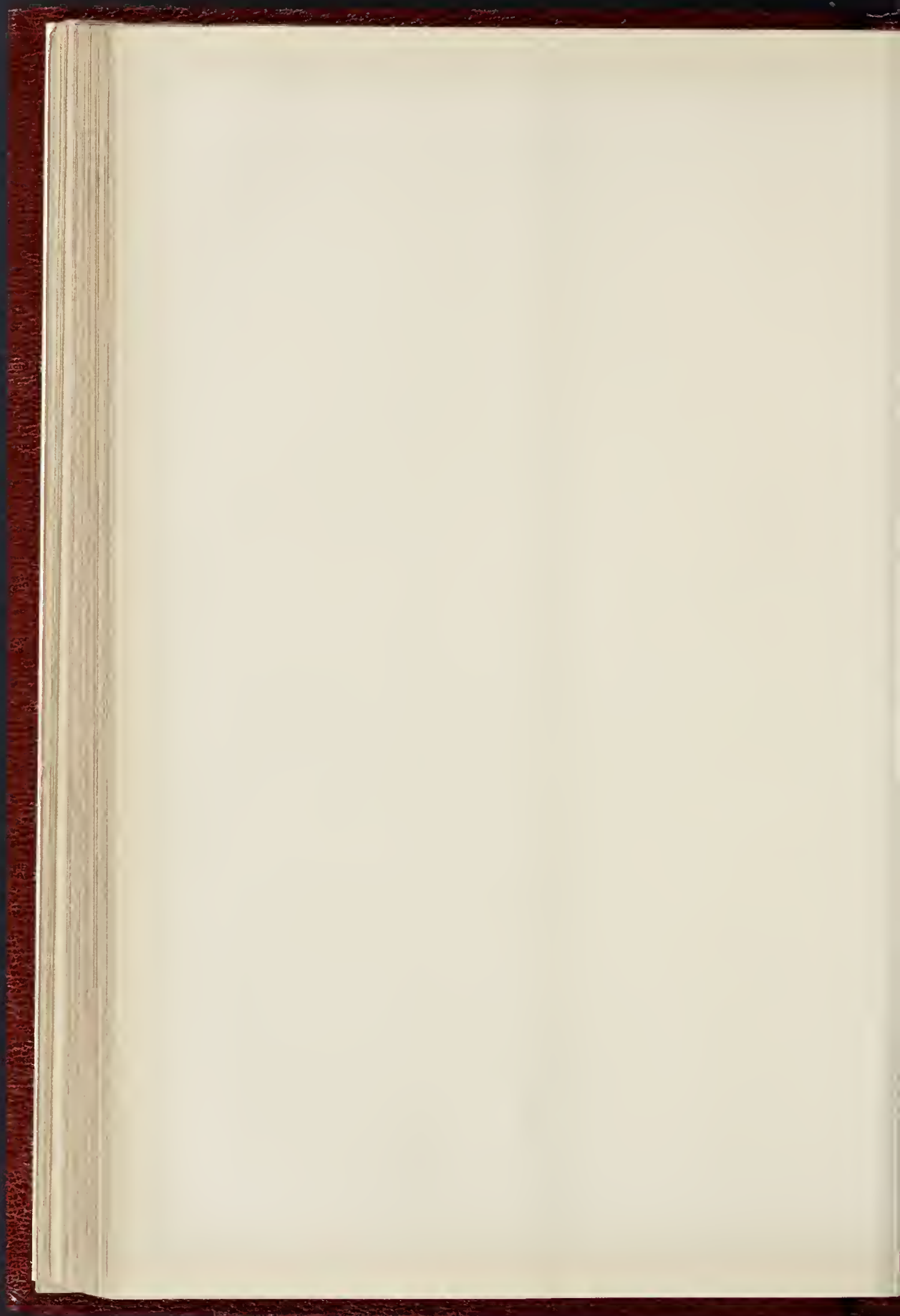
Taunton Castle.
The Courtyard.



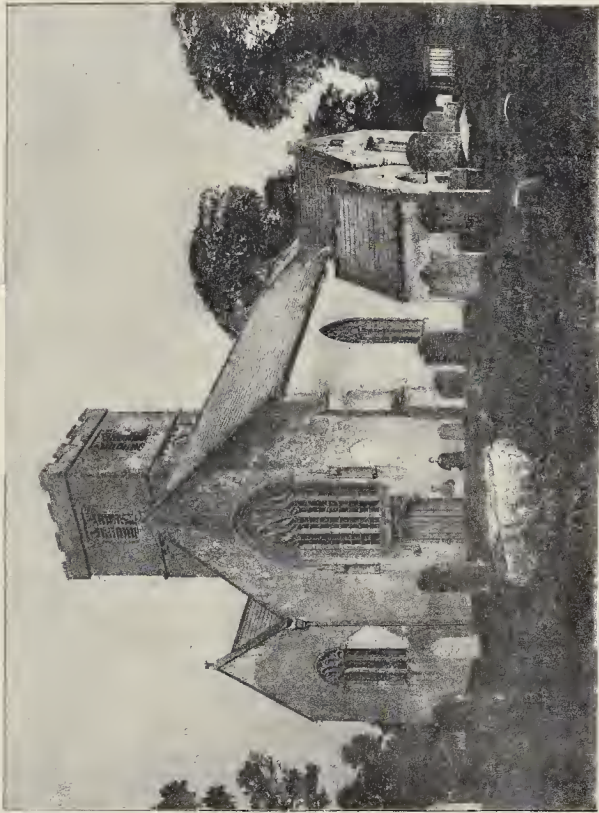


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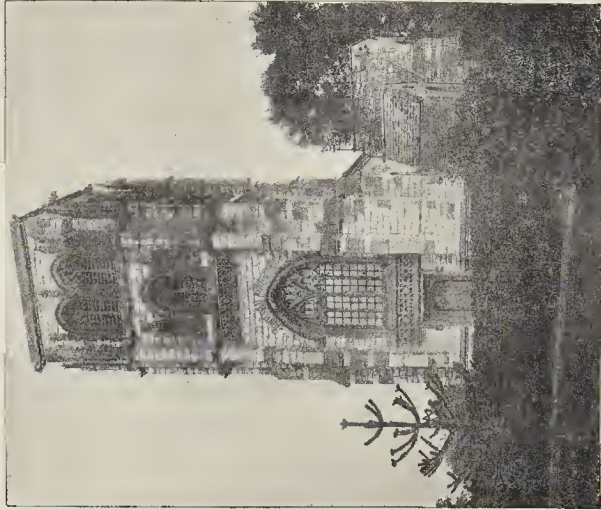
ARCHITECTURAL ASSOCIATION EXCURSION, 1892.—COOMBE SYDENHAM. FROM SOUTH-WEST.







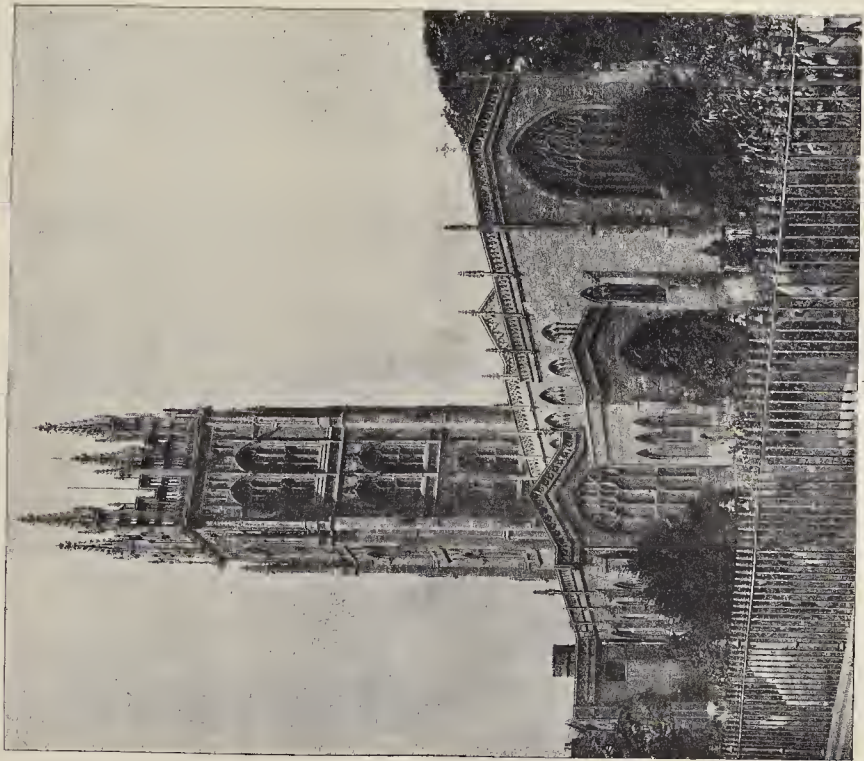
CREECH S MICHAEL.



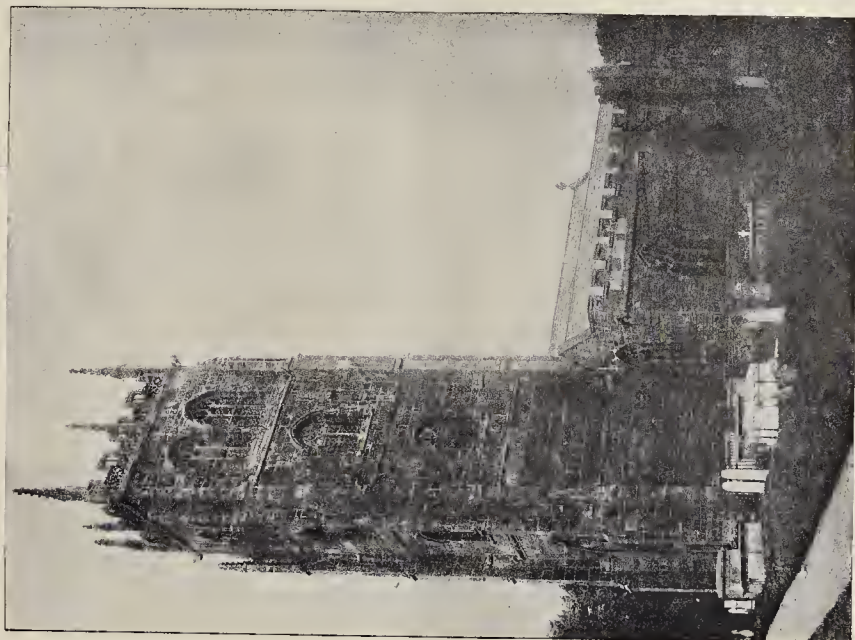
RUISHTON.



S. JAMES, TAUNTON.



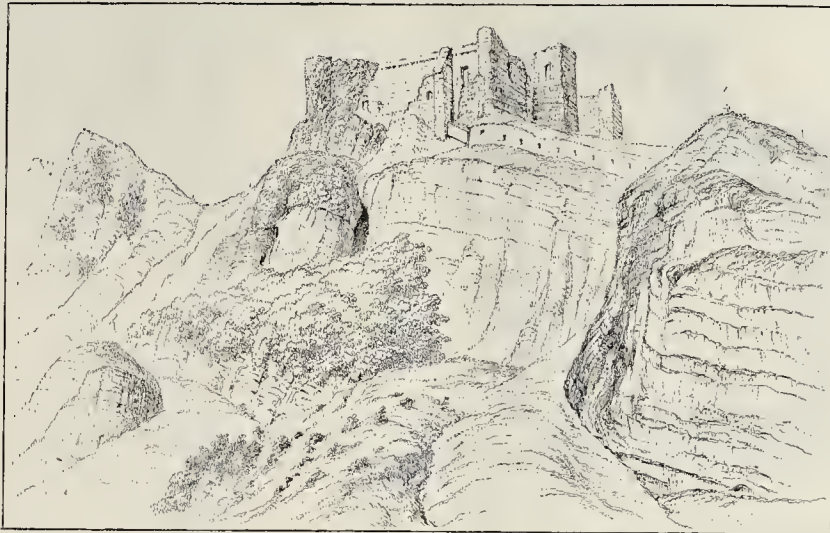
S. MARY'S TAUNTON.



BISHOP'S LYDEARD.

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ARCHITECTURAL ASSOCIATION EXCURSION, 1892.
SOME OF THE CHURCHES VISITED.



Castell Carreg Cennen, from the South. From a drawing by H. Longueville Jones. Engraved by J. H. Le Keux.



Cross-head, Llandello (Front).

Henry Earl of Richmond, afterwards Henry VII., slept on his way from Pembrokeshire to Bosworth in 1485. The house has been modernised, but contains a chapel and details of the fourteenth century.

The carriages now turned southward towards Dryslwyn (pronounced Drnslyn), where the river Towy is fordable and crossed by a foot-bridge. Castell Dryslwyn, a mere shell with pointed windows, occupies a prominent position on an isolated hill rising at a steep angle from the river. Resuming again a westerly direction for a mile and a half, the party arrived at Llanarthney, where luncheon was provided. The church here was described by the Rev. Canon Harris. The chief object of interest is a fine wheel cross of the ninth century, ornamented with very rudely-executed patterns. It bears an inscription in minuscules, which reads:—

merclea . . . cema
elmat(s) (fecit crucem)

It is difficult to make anything intelligible out of the first line, but the second clearly shows that the cross was erected by Elmat. The name Elmat occurs on a cross at Tintagel, Cornwall.

Leaving Llanarthney, a drive of two miles brought the party to Middleton Hall. This mansion takes its name from David Middleton, other to Sir Hugh Middleton, or Myddelton,

the Welshman, to whose enterprise London is indebted for its New River Water Supply, an original share in which undertaking is now worth a king's ransom. Mrs. Abraham, the present owner, received the members, and exhibited a number of antiquities collected from the neighbourhood, including a bi-lingual ogam inscribed stone found at Llanwinio in 1846, the matrix of a thirteenth century seal with the Virgin and Child upon it, and several bronze celts and spear-heads.

On the return journey to Llandello, a distance of eight miles, a short stay was made at Golden Grove, the residence of Lord Emlyn. The house is comparatively modern. The chief historical associations connected with the place relate to Jeremy Taylor, who found a refuge here when his living was sequestered during the Parliamentary war in the time of Charles I. In the American Garden at Golden Grove is an elaborately ornamented cross-shaft of the ninth century, brought from Glandsannan Farm, two and a half miles N.E. of Llanarthney. It bears the name Eludon in minuscules, and was locally known as the "Llech Eldon," or Eldon's Stone. Mr. Romilly Allen read a paper on this remarkable monument, in which he showed that the ornament was identical with that on the crosses at Llantwit Major, in Glamorganshire, and at Carew and at Nevern, in Pembrokeshire. He also remarked upon the similarity of

some of the patterns with those in the Gospels of Macdhrnan, at Lambeth, and the Gospels of Macregol, at Oxford, and thereby proved that the Llech Eldon must be of the ninth century.

On the morning of Thursday, August 11, the excursionists left the "Cawdor Arms" at 9 a.m. by carriage for Derwydd, Llandybie, and Castell Carreg Cennen, which lie to the south of Llandello. A steep descent down the main street of the town, past the parish church, leads to the fine stone bridge of one span over the river Towy. After crossing the strath through which the Towy flows, the road enters the valley of the Cennen and follows its course along the east bank as far as Derwydd, about three and a half miles south of Llandello. Before proceeding to Derwydd House, a slight deviation was made from the road to examine the Maen-Llwyd (i.e., grey or old stone), on Cefin Cethin farm. The monument is an upright pillar of limestone 8 ft. 6 in. high, standing in the middle of a field. Upon one face a very distinct outline of a bow and arrow is incised, having every appearance of great age. In Scotland, standing stones bearing incised symbols are not unknown, but this is, perhaps, the only thing of the kind in Wales. There are instances of the bow and arrow being used symbolically on sepulchral slabs of the thirteenth and fourteenth centuries, in the same way as the sword, to indicate that the grave-stone is that of a warrior. The bow and arrow on the Maen-Llwyd may possibly have a similar signification. It is difficult to assign any date to this curious piece of sculpture.

At Derwydd House the archaeologists were received most courteously by the owner, Mr. Alan Stepney-Gulston, who led them through the various rooms, explaining as he went the points of interest in each. The house is an old one, dating back to the fifteenth century or earlier, modernised with excellent taste and wise discretion, so that nothing ancient has been tampered with. In addition to a fine collection of Oriental porcelain, and Hispano-Moresque faience, Mr. Gulston is the happy possessor of many historical relics of great value. Chief amongst these is the carved oak bedstead traditionally believed to be that of Sir Rhys ap Thomas, the illustrious Welshman to whose timely assistance Henry VII. partly owed his throne. The four posts of the bedstead are elaborately ornamented, and bear the arms of Sir Rhys ap Thomas. Round the three sides at the top is a beautifully executed frieze, about a foot deep, upon which are represented a procession of figures consisting of warriors on horseback and on foot, monks, musicians playing the drum and harp, ladies, &c. As a study of mediæval costume nothing could be better. The artistic merit of the carving is considerable, and it would be very desirable to have it examined by a specialist with a view of determining whether



Plan of Castell Carreg Cennen.



Plan of Cwrt Bryn-y-Beirdd (from the South).

it is of foreign or native workmanship. In the entrance hall at Derwydd is preserved the celebrated "Hoda cum Tawdr" cabinet, of carved oak, and decorated with the coats-of-arms of families mentioned in the old Welsh pedigrees of George Owen (1591). Many other interesting objects were exhibited in glass cases, all admirably arranged and labeled, amongst which were the seal of Oliver Cromwell, and the badge of a local Jacobite Society, called the "Sea Sergeants." In the upper rooms of the house are some good plaster ceilings of the sixteenth century, and one or two carved stone mantel pieces of the same period.

Resuming their carriages, the members placed themselves under the guidance of Mr. Gulston, who led the way to the Pant-y-Llyn hone caves, one mile south-west of Derwydd, and there delivered a short address in the open air on what was known of the discoveries made in these subterranean dwellings of pre-historic man. Only the site of the cave is now to be seen, as the whole of it has been removed in quarrying operations. Unfortunately the bones of extinct animals that were unearthed are now buried

under many tons of debris in front of the quarry, and the human remains have all been lost with the exception of one skull which is preserved in the Oxford Museum. Mr. Gulston deserves great credit for having collected with so much assiduity the facts relating to this remarkable find.

From Pant-y-Llyn, a descent of about a mile brought the party to Llandybie Church, the examination of which was soon accomplished, as it contains nothing of sufficient interest to detain the archaeologist. The carriages now returned along the high road to Llandello, and branching off at a point near Derwydd, where the river Cennen suddenly changes its course from a southerly to an easterly direction, soon reached Castell Carreg Cennen. A halt of a few minutes was made on the way, at Llwyn Beddan, to inspect a sepulchral cist, about 4 ft. square, formed of large stones set on edge, the sole survivor of seventy others stated to have existed on this spot.

Castell Carreg Cennen, although its ruins are not anything like so extensive as Kidwelly, or even Dynevor, is yet far more imposing than

either on account of the romantic position it occupies on the summit of a steep limestone crag, rising abruptly from the River Cennen, which flows at its foot on the south side. The distant view, as one approaches it up the valley of the Cennen from the west, is so striking and peculiar that it is difficult to believe that one is living in the world of soher fact, and not face to race with the enchanter's castle of mediæval romance. Before the days of artillery, the stronghold must have been almost impregnable, and its position, overlooking a wide stretch of country, would make it very useful as a watch-tower for the district. The plan is, roughly speaking, a square of about 100 ft. each side. The main entrance is on the north, and is flanked by two towers with octagonal ends. There are other towers at the angles, and a small projecting one on the east side, containing the chapel. The approach to the castle is from the north. On the south the limestone cliff is almost perpendicular, rising to a height of more than 100 ft. above the Cennen. The ground on the two remaining sides (the east and the west) is less precipitous, but still so steep and rough as to form an admirable defence. There are hardly any architectural details now remaining. The little trefoil ornament on the springing of the arch of the principal gateway is worthy of notice. The same thing occurs at St. Quentin's Castle, near Cowbridge, which is no doubt of the same period. It is difficult to assign a date to Castell Carreg Cennen. Roman coins have been found within the enclosed area, and some wild enthusiasts did not hesitate to put down the masonry of the lower part of the walls,—which is different to the rest and better built,—as Roman. A more probable view is that it was constructed by the De Loudres, Lords of Kidwelly, as an outpost to the larger fortress, in the twelfth century, and was further strengthened in Edwardian times. The castle was given by Henry VII. to Sir Rhys ap Thomas, and eventually came into the hands of the Earls of Cawdor, through the Vaughans of Golden Grove.

One of the most interesting features of Castell Carreg Cennen is the remarkable covered way, which leads from a small opening in the south curtain wall down to what is supposed to be a well right in the heart of the limestone rock on which the fortress stands. The first portion of the passage is artificially constructed against the side of the cliff, and descends at a considerable angle in an easterly direction, the wall being loopholed at intervals to admit the light. The roof of the passage is of triangular section near the top, but like a penthouse-roof lower down. The bottom and inner sides of the passage are formed by the solid rock, the roof and outer side being artificial. At the bottom of the descent is a short flight of steps turning sharp round to the left and leading into a natural tunnel in the limestone extending for perhaps a hundred yards inwards from the face of the cliff. This tunnel terminates in a perpendicular shaft 6 ft. deep, now perfectly dry; near it is a very poor spring of dirty water, into which visitors, especially ladies, make a point of dropping in bent-pins, not forgetting mentally to wish for some long-cherished object of desire.

The last place visited was Cwrt Bryn-y-Beirdd, an ancient Welsh mansion, now converted into a farm house, situated a mile south of Castell Carreg Cennen, on the opposite side of the valley. This portion of the excursion had to be accomplished on foot, as there is only a pathway leading to it in this direction, and the descent down one side of the valley and up the other is very trying, even to pedestrians. Cwrt Bryn-y-Beirdd, of which we give a plan is pronounced by Professor Babington to be "one of the most interesting specimens in existence of a gentleman's house" of the time of Edward II. It contains many architectural details of the Decorated period, including an old fire-place with angle brackets at each side, in one of the upper rooms, and several cusped and pointed windows. Since the previous visit of the Cambrian Archaeological Association to this spot in 1855, many ancient features have disappeared, which is much to be regretted.

The party returned thence direct to Llandello, well satisfied with the day's work.

In the evening, papers were read by Mr. J. Willis Bond, F.S.A., on "Tello Churches," and by Mr. D. Llewellyn Thomas on "Ancient Tenures."

The last day's excursion, the fourth of the series, on Friday, August 12, was to the great pre-historic fortress of Carn Goch, Llangadock, and Llandoverly, all lying to the north-east of Llandello on the valley of the Towy. The weather, which had been unusually fine during the previous three days, still continued to be propitious. Leaving the Cawdor Arms at the usual early hour, the carriages were soon at the foot of Carn-Goch, four miles north-east of Llandello. After a pretty stiff climb up the hill-side, the party assembled within the enclosure to hear Mr. Edward Laws, the learned author of "Little England Beyond Wales," deliver a most instructive lecture on the remains. The gist of Mr. Laws's remarks was that he believed Carn Goch to be a fortified city of the Bronze Age, and he stated his reasons for coming to this conclusion in a very lucid manner. He described the typical stronghold of the Neolithic people who preceded the bronze-using race, observing that they relied more on nature than on art for their defences, and that such military works as they were obliged to construct consisted of small camps exposed to all the winds of heaven, and scarcely ever supplied with water. After considerable experience in exploring earthworks of the kind, he had formed the opinion that they were not dwelling-places, but refuges for a sparse population, who lived in the valleys below, and that, when danger appeared, the fighting men of the tribe hurried the women, children, and long-faced oxen, hairy little sheep, and great, long-legged pigs into these temporary places of refuge, where they made a stand until relieved by their neighbours. At Carn Goch, on the contrary, there was an excellent water supply, gigantic works, which proved the co-operation of a considerable population, and engineering of a very different order from that exhibited in the little cliff castles along the coast. The inhabitants of the fortress probably lived within the walls permanently with their flocks, herds, and other belongings. This view was borne out by a number of hut circles still visible inside the enclosure. Mr. Laws remarked that the fortification closely resembled certain camps in North Wales, and was exceeded in size by some of them, but Carn Goch was the largest in South Wales. One like it existed at Strumble Head, in Pembrokeshire, although inferior to it as regards size. Were he to dig within the walls of Carn Goch he would drain the pond which formed the water supply, and explore the interior of the wall enclosure, the great cairn, and the circular spaces in the walls. All this, however, should be done most carefully by skilled hands, for the man who destroyed relics of the past, simply to gratify a senseless curiosity, was guilty of a crime little short of sacrilege.

There are two camps at Carn Goch, the larger one being of approximately oval shape, 2,000 ft. long by 500 ft. wide; and the smaller one, which lies to the south-west, at a lower level, being an oval measuring 500 ft. by 350 ft. The walls are of dry rubble, with well-formed salient ports, or roofed passages extending right through the rampart, at intervals. The debris of the walls is in some places 70 ft. wide and 16 ft. high. The situation of Carn Goch resembles that of the great prehistoric hill fort called the White Caterthun, near Brechin, in Forfarshire, in being on the borderland between the cultivated part of the country and the wild, barren tracts of heath-covered mountains behind it.

Leaving the breezy heights of Carn Goch, the party descended on the opposite side of the hill from the one they had come up, and, resuming their places in the carriages, were conveyed to Llangadock. Just before entering the town a short stop was made to examine Castell Meyrig, an earthwork of the same class as those which had been seen on Tuesday's excursion at Talley and Twrfa, consisting of a moated mound and base-court. The village common, just beyond, with its clumps of furze bushes, presents a pleasing contrast to the highly-cultivated fields which surround it. Llangadock church is devoid of interest, and built on the same double-barrelled principle of ground-plan as the others in this district. After luncheon, two excellent collections of local antiquities were inspected at houses in the village, one belonging to Mr. Lewis Lloyd, and the other to Mrs. Thuraby Pellham. Amongst the latter was a Roman intaglio ring, bearing a representation of Venus Victrix, holding the apple in her hand, which was found some years

ago at Abermarlais, on the opposite side of the river Towy.

The party next went on to Llandoverly by train. This place was really hardly worth the trouble of a visit. It has two churches, Llandingat, half a mile south of the town, and Llanfair-ar-y-Bryn, about the same distance to the north of it. Llandingat Churchyard contains the grave of Sir Gardner Wilkinson, the eminent Egyptian archaeologist (born in 1797, and died in 1875). The church has more good architectural points about it than most of the others seen during the meeting. The tower is one of the best in the district; the chancel arch is Transitional Norman, though very plain; and the original Decorated and Perpendicular tracery in some of the windows is distinctly above the average. The restorer seems, for some inscrutable reason, to have played fewer pranks than usual with the building. Vicar Pritchard's house and Llanfair-ar-y-Bryn Church, where there are some curious gargoyles to the tower, were hurriedly looked at, and the party then returned by train to Llandello.

In the evening a general meeting of the members was held at the Cawdor Arms.—Sir James Williams Drummond being in the chair,—at which votes of thanks were accorded to the local committee and the officials of the Association, whose labours contributed to making the Llandello meeting one of the most successful yet held. The names of Mr. J. Lewis Thomas (Local Secretary) and the Rev. Charles Childew (General Secretary) were specially mentioned.

It was announced that the next annual meeting would be held at Oswestry in 1893.

SEWAGE AND ITS PURIFICATION.

DR. CHARLES A. BURGHARDT, Ph.D., &c., Lecturer and Examiner in the Victoria University, Manchester, Analytical and Consulting Chemist, read a paper on this subject at the recent annual meeting at Bury of the Incorporated Association of Municipal and County Engineers. Sewage, he said, is a very complex substance, chemically speaking, and can be divided into two distinct classes:—

1. Domestic sewage, which is mostly animal in its origin, and much charged with nitrogenous and carbonaceous matters which are more or less easily decomposed by so-called secondary decomposition, induced principally by the oxidising action of the oxygen of the air. The nitrogenous matters consist of urea, uric acid, colouring matters of animal origin, mucus, and various bodies in a state of unstable equilibrium, somewhat resembling albumen in their chemical characteristics, and called generally, for the want of a better term, "albuminoid matter."

2. Manufacturers' sewage, or the waste waters from all kinds of chemical works, dye works, bleach works, paper mills, &c. As a rule, this class of sewage is not rich in nitrogenous matters, but it is generally rich in carbonaceous matters, both in solution and suspension, and highly charged with various salts in solution. The substances in this class of sewage are more stable than those present in domestic sewage, consequently they are not so easily decomposed or oxidised, and their presence in a mixed sewage is, therefore, highly objectionable, because they actually prevent to a very great extent the oxidation and destruction of the domestic sewage, and act as a "resist" to the oxygen of the air.

From this generalisation of sewage I think it is clear that we Lancashire men have, unfortunately, the very best opportunities for thoroughly studying the question of its treatment, for we can certainly claim to turn out the most complex and abominable mixtures of sewage into our streams which it is possible to produce. Every possible variety of sewage is represented, and the investigator has all the material necessary for his enquiry at his own door. In a manufacturing district, therefore, the sewage of towns and townships consists of a mixture of the two above-mentioned classes of sewage, and it is constantly varying in composition, no two consecutive hours being alike. For this reason it is almost imperative that such sewage should be treated specially, with regard to the particular district from which it arises, it being scarcely possible to lay down one uniform method of treatment which will successfully meet all cases.

Some years ago I pointed out the immense importance of removing sewage of both classes

from our streams, for this reason, viz.: if it were not removed, and pollution continued on the same scale, then it was quite certain that a time would come when our Lancashire streams would be so foul that no manufactures requiring clean water could be further carried on, and such manufactures and processes would be strangled by their own act, and the trade transferred to some other locality or country where such a disgraceful state of affairs did not exist. This was in 1884, and we now see in 1892 already signs that this opinion of mine was well founded. I shall deal with this subject of river pollution after I have dealt with that of sewage treatment, at the end of this paper. With regard to the treatment of sewage, it may be said that there are, broadly speaking, three general methods or systems adopted in this country, viz.:—

1. Irrigation and sewage farming.
2. Intermittent downward filtration.
3. Precipitation by chemicals, with or without subsequent intermittent downward filtration.

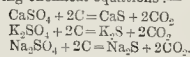
With regard to the first method, it has been known for a long time that, on the whole, it has proved to be a costly, and, I may also say, a ghastly failure. It is only in a very few highly-favoured districts where such a system can be successfully carried out, so far as the purification of the raw sewage is concerned, and in all these cases there still remains the undeniable fact that from our present knowledge of the spread of disease by means of micro-organisms, the covering of large areas of land with a deposit of sewage sludge or mud is a constant menace to the health of the people living in the neighbourhood of such areas. As the mud dries the micro-organisms (some of which may be highly septic) are spread by the wind far and wide, and find a congenial home in the bodies of the unfortunate population whose constitutions have been previously much impaired by the foul exhalations which rise (particularly in summer evenings) from such sewage farms. It is only possible to produce a suitable effluent from raw sewage by irrigation when there is a sufficient depth of porous soil as a filtering medium, and, further, a large enough area to allow of a change of top soil from time to time by ploughing or other means. If these conditions cannot be complied with, sewage irrigation becomes absolutely impossible, on account of the choking-up of the surface of the land by the "sewage slime." Looking at this branch of the subject from another point of view, it is an outrage upon all natural laws. Plant life takes up its nourishment from manures, either liquid or solid, in very small quantities at a time, and only at certain seasons. At other times the presence of such manure would be absolutely useless to the plant, and probably detrimental to its progress. From this it is evident that plant life on a sewage irrigation farm must be in anything but a really healthy condition if the work of sewage purification is to be carried out day and night for the whole year, for many a time when it ought to have rest the plant would be deluged with sewage matter which it cannot assimilate, or at other times when it really wants support it cannot obtain it, because the surface of the ground being completely choked with sewage-slime, the roots of the plant are deprived of the necessary aëration on the one hand and sun's action on the other. Further, in deep winter, when the ground is frozen hard, the raw-sewage cannot be purified at all, and is generally discharged in that condition into the nearest stream. The same thing occurs in summer in some places where hay is a crop grown on the farm, no raw or even settled sewage being allowed on the hay-grass for some considerable time, and consequently the crude sewage passes unpurified into the nearest stream as a matter of course. I have had personal experience of this partial treatment on many occasions, and in all, a fearful nuisance was created by the discharge of this crude sewage into brooks which were otherwise clean, and injunctions were obtained by property owners on these streams against the local authorities who were the offenders. There cannot be any doubt, therefore, that simple treatment of sewage by passage over land, either good or bad, is quite unsuitable and dangerous to the health of the community. Even sewage irrigation supplemented or preceded by settlement of some of the suspended matters is also a proved failure, as all the objections cited above are equally applicable to this modification. Many local authorities have adopted this or some similar treatment on account of its so-called cheapness, but they will

shortly he made aware by the County Councils that their disgusting effluents cannot any longer be tolerated in our streams; therefore, they must eventually adopt an entirely different treatment of their sewage if they wish to avoid unpleasant consequences.

I come now to the second method of treatment, "intermittent downward filtration." Where this process is carried out upon crude untreated sewage, I have no hesitation in saying that it must result in failure for the same reasons given above, that irrigation is a failure, and local authorities will certainly be compelled to modify and supplement their sewage treatment where simply intermittent downward filtration is adopted. For large towns in populous manufacturing districts such a plan of sewage treatment is quite impossible, on account of the enormous area of land which would have to be acquired for the purpose, it being understood that not more than the sewage from about 400 people should be drained upon one acre of good filtering land. Some authorities go as high as 1,000 of population to one acre of the very best filtering land, and as low as 250 of population to one acre of bad filtering land. I consider it quite impossible to filter the sewage from a population of 1,000 upon an acre of the very best filtering land, and also 250 or even 100 of population upon an acre of bad filtering land. Bad filtering land ought not to be applied to such a purpose under any circumstances whatever.

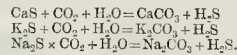
I do not think it necessary to go into this part of the question any further, because every one who has had any experience at all in sewage treatment has long been of opinion that filtration of raw sewage without a previous purifying treatment is obsolete. It will be seen later on that purified or treated sewage, if passed over suitable land or filters of sufficient area, gives an excellent filtered effluent which is quite fit to turn into any stream. Before considering some of the various chemical or "precipitation processes" I think it will be more convenient to briefly describe the general chemical alteration which domestic sewage undergoes when mixed with water, for water-borne sewage is now the rule and not the exception, therefore those places where the dry earth or the pail systems are adopted being few and far between, such methods of treatment need not be considered in a paper on sewage treatment.

Domestic sewage contains nitrogenous and carbonaceous bodies, both in solution and in suspension, those present in the latter being fecal and most objectionable in character, although not more dangerous from a sanitary point of view than the dissolved nitrogenous and carbonaceous matters. In this sewage matter (principally that in solution) there are sulphates of the alkalies and alkaline earths, calcium phosphate, and the so-called albuminoid matters. The great decomposers are in reality numerous species of micro-organisms of all classes, micrococci, bacteria, bacilli, &c., which split up the above-mentioned albuminoid and carbonaceous bodies into simpler bodies, the final results of their activity being ammonia (obtained principally from the albuminoid matter), carbonic acid gas, obtained by the oxidation of the carbon of the various matters, both albuminoid and carbonaceous (for the albuminoid matters also contain carbon as a constituent), sulphuretted hydrogen obtained above, by the liberation of nascent or atomic carbon and its immediate recombination with the oxygen of the sulphates themselves, resulting in the production in the first stage of carbonic acid gas or carbon dioxide and calcium, potassium, or sodium sulphide; according to the following chemical equations:—



Now we do not find in sewage which is freely acted upon by the oxygen of the air, any sulphides of the alkalies or alkaline earths, but we always do find a considerable quantity of a black insoluble precipitate or deposit at the bottom of a tank or brook in which sewage has been exposed for some days to the air, and on analysis we find that this black substance is a sulphide of iron. How does it get there? As an excess of carbonaceous matter is always present in domestic sewage, the action of the micro-organisms produces from it (assisted by the oxygen of the air) a large quantity of carbon dioxide, which largely dis-

solves and is retained by the water; in fact, decomposed sewage is saturated with dissolved carbon dioxide. This carbon dioxide dissolved in the water now attacks the above-mentioned sulphides and converts them into carbonates liberating at the same time sulphuretted hydrogen gas, some of which is liberated from the water in the form of bubbles which soon make their presence evident by their very characteristic smell, whilst another portion of the sulphuretted hydrogen combines with any suitable iron compound in its immediate neighbourhood which may be present in solution, or, failing that, suspended hydrated ferric oxide derived from various sources, which is generally present in the beds of most brooks or rivers. In any case this black sulphide of iron is produced and carbonates of the alkalies and alkaline earths are also produced. This production of these carbonates from the sulphides constitutes the second stage of the reaction mentioned above, and it takes place according to the following chemical equation, viz:—



This then is what occurs when sewage is freely exposed to the action of the air. When the air is wholly or partially excluded, the reaction is somewhat different, the production of carbonates being much smaller in amount, whilst the ammonia produced from the albuminoid bodies mostly combines with the sulphuretted hydrogen (which in any case is always present in more or less amount in decomposing sewage, even when free oxygen is almost absent), forming a solution of ammonium sulphide, a most foul smelling and dangerous compound. I have known this substance to be produced very largely upon filter beds which had become completely choked and would not any longer allow the passage of water through the filtering medium, the stagnant sewage lying upon the beds to the depth of about 2 ft. It was this depth of liquid which caused this mischief. Oxidation could only take place upon the surface, and the bulk of the liquid gradually became strongly charged with ammonium sulphide. On exposure to air ammonium sulphide rapidly decomposes into free ammonia, water, and free sulphur, the latter making its presence evident by forming a film of sulphur upon the surface of the sewage.

The micro-organisms continue their useful work and increase enormously in number until the unoxidised carbonaceous matter is oxidised as much as it can be, and until all the albuminoid bodies are decomposed and resolved into less complex bodies. When the process is complete most of these organisms die; in fact, there is no doubt that some of the products of their activity are poisonous to them, and perhaps also to mankind. Albuminous bodies which undergo a similar decomposition produce highly poisonous products sometimes, to which the name ptomaines has been given; these ptomaines are found in decomposing flesh, &c., and closely resemble both chemically and physiologically some of the well-known alkaloid poisons. In addition to the above-mentioned decomposition products there are two substances always present at the end of the process, not definite chemical compounds, but still, chemically speaking, always similar in their characteristics. One of these substances is insoluble in water, gum-like in character when concentrated, but flocculent when in oxidised sewage. This insoluble gum-like body is a product of the oxidation of the albuminoids and carbonaceous bodies in the original sewage, and is the substance which is most detrimental to the action of a filter, because it chokes up the pores, owing to its slimy consistency. The second substance, which is present in decomposed oxidised sewage, is soluble in water, gum-like in character, and not further oxidisable except by strong chemical oxidisers, and only then in a very partial manner. It is quite harmless in water. From the above-mentioned facts it is evident that micro-organisms are not altogether objectionable in character. They perform a good work for us, and assist us largely in sewage purification. They certainly take a long time to carry out their operations, but this seems to me to point out a direction in which to work, namely, to utilise these countless organisms as purifiers of the final effluent from our sewage treatment. Treat the sewage by the best and most convenient process first, and then leave these

organisms to complete the work of purification in their own way.

The decomposition of raw sewage or effluents which is brought about by micro-organisms or other causes is termed "secondary decomposition." The same kind of decomposition takes place in moist or wet sewage mud or sludge, hence the objectionable smell occasionally observed on visiting sewage-works. I append to this paper some results of my analyses of sewage-muds, giving the principal constituents. I shall consider the sludge question at a later stage; it is the most difficult part of the problem, as most of us know. I think I may safely say that both irrigation sewage farming and filtration of raw sewage over or through land is a proved failure, and further that at last the inevitable day of chemical precipitation, supplemented by filtration either through specially constructed filter-beds or over properly prepared filtering land, has arrived and will be the only possibly efficient way of purifying sewage in order to fulfil the requirements of these days in regard to it. We cannot any longer allow sham or inefficient processes to be put up on our local rivers for dealing with sewage, because nothing less than absolute efficiency will be allowed if the Manchester Ship Canal is to be a possible waterway to Liverpool and the sea. If some of the present inefficient schemes are not considerably modified, I firmly believe that the Irwell water will be too foul for storage in docks, unless the deposit is often cleaned out from the said docks completely. This applies equally to the canal itself. No half measures can be allowed in this case, nothing less than the very best process or processes that science can devise for the treatment of sewage must be adopted for any locality ultimately draining into the river Irwell or any of its tributaries. When I speak of sewage in the Irwell and its tributaries, or any other river, I refer to both domestic and manufacturers' sewage. All of it can be efficiently and easily dealt with now, and there is no reason why the Ship Canal need be troubled with putrescent sewage at all.

Having considered the treatment of sewage by irrigation, and also intermittent downward filtration unassisted by chemical precipitation, and also the decomposition phenomena observed when sewage undergoes secondary decomposition, I will now pass on to the consideration of what are known as precipitation processes. I may say at once that I shall only consider those processes which have been for some considerable time in actual practical operation in this country, and further been examined and tested practically by the Corporation of the County Borough of Salford. In the years 1890 and 1891 I had the honour of being appointed the referee chemist to the Salford Corporation on the series of important tests of leading sewage processes, which were carried out at the Corporation Sewage Works at Weaste, upon the mixed sewage of the borough. As is well known, the sewage works at Weaste are designed for the treatment of the sewage by what is known as the lime-process. It is unnecessary to describe the works in this paper, but for those who have not any knowledge of the Salford Corporation have printed a small pamphlet describing it thoroughly, giving at the same time careful drawings of the tanks, &c.

I think it may be safely asserted that the lime precipitation process is the oldest precipitation process at present in use. For many years it apparently satisfied the requirements of particular localities and no complaints were heard of it, but this "golden age" of the lime process was really fostered by the happy ignorance of the public as to its real character. They thought it produced beautiful, clear effluents, and, best of all, was very cheap. We know to-day that it may be cheap, but it certainly is exceedingly nasty. During the last ten years chemical science has demonstrated beyond any further discussion that an alkaline effluent (where the alkalinity is due to excess of free caustic lime) is one which is more liable to produce secondary decomposition and consequent nuisance than a neutral or even acid effluent, the reason being the fact that the putrescible insoluble organic matters in suspension are decomposed by the caustic lime and made soluble in water, consequently the effluent water from such a treatment contains in solution a very large amount of partially decomposed organic matter, derived principally from faecal matter in a peculiarly putrescible condition. Further, the

The Students' Column.

CONCRETE.—VIII.

ARTIFICIAL CEMENTS (continued).

PORTLAND: IMPORTANCE OF TESTING.

THE necessity of testing Portland cement before using it in important works is recognised by all engineers, and ought to be recognised by all architects. It may be argued that, if the cement be obtained from a firm enjoying a good reputation, there is no need for tests. There is, perhaps, less need for them, but they ought not to be altogether omitted. In this day of advertisement, it is often difficult to ascertain whether a reputation is founded on good manufacture or on advertisements; and even if the cement from a reliable manufactory has been specified, there is a possibility that another kind may be used instead. Another argument that may be advanced is that the contractor is responsible for failures in material, and that, if by using inferior cement the concrete should fail, he will have to do the work again at his own cost; therefore, the *onus* of testing, it may be said, rests upon him. A moment's consideration will show how unfair to the building-owner is such a view of the case; for the building-owner may have to bear the loss by delay consequent on the failure of the cement, or may be able to recover damages only after an anxious lawsuit. Again, there is a grave danger that the had character of the cement may not discover itself until some months have elapsed, perhaps not until the architect's final certificate has been granted, and, in the latter case, there will probably be trouble for architect and contractor, as well as for the building-owner; and further, a cement may be used which produces concrete sufficiently good to escape condemnation, but which is far from being the best which could be had obtained under the terms of the specification, and in this case the building-owner is decidedly the loser because proper tests were not carried out. When we think of the important uses to which concrete is put in our buildings,—as, for instance, foundations and floors,—we cannot fail to see the necessity of knowing the character of the cement,—which is its most important ingredient. To specify that "the best heavy Portland cement" must be used is not enough, but such a description is far from uncommon. Quite recently a case came under the author's notice in which the concrete for an engine-bed was specified to be of cement, vaguely described as in the last sentence, and of broken stone, &c., in the proportion of one to four,—a proportion of cement to aggregate which ought to have insured an excellent concrete; but what happened? The concrete was deposited and set properly, but after a month it began to show signs of disintegration, and it gradually crumbled until the architects had to order its removal; the contractors removed it and laid a new foundation, and on the completion of the whole building claimed an "extra" for the work. The architects refused to allow the claim, but, believing that the contractors had not wilfully used inferior material, they asked the building-owner to deal generously with the unfortunate builders. Altogether a very pretty middle, and one which probably would have been avoided if the cement had been submitted to one or two comparatively simple tests.

Test Specialists.—We do not mean to say that architects must fit up a part of their offices as testing laboratories, and themselves become proficient in the art of making and breaking briquettes, &c. No, architects have quite enough on their hands without taking up another burden. The necessary appliances for testing are many and costly, and the testing itself is no easy matter. For instance, it requires considerable practice to carry out properly the many operations necessary in ascertaining the tensile strength of cement. That proportion of water which is most suited to the character of the cement must be learnt; the requisite amount must then be weighed, and thoroughly mixed with the cement, care being taken that the water, cement, and air are at the uniform temperature of about 60 deg. Fahr.; the moulds must next be thoroughly filled with the cement paste, and kept in a moist atmosphere for a certain time (usually one day), after which the briquettes are released from the moulds and placed under water kept at a

temperature of about 60 deg. for a further period or periods (sometimes two or six days, sometimes twenty-seven or more). The briquettes must be accurately placed in the testing-machine, and the strain should be applied regularly and not too slowly. Even the weighing of cement is not as easy as one would imagine, and when it is remembered that the fineness, soundness, and specific gravity are of importance, it will be understood that architects cannot be expected either to learn how to test cement or to provide the apparatus required in carrying out a series of tests. But nowadays there are specialists of all kinds, and cement-testing is not without its specialists. For large works, a clause might be inserted in the specification to the effect that the contractor must include a certain sum for cement-testing, the tests to be carried out by a specified person or by one to be approved by the architect. For small works, the cement might be specified to be obtained from a particular maker, and the architect or the clerk of works could, easily test the cement as to its "soundness," taking its fineness and strength for granted.

Tests.—The tests now considered of primary importance are those for ascertaining the fineness, tensile strength, and soundness of the cement. The specific gravity is also thought by many to be of importance, but the weight, which at one time was considered the most notable characteristic (perhaps, because it could be ascertained with comparative ease), does not now command very much attention, and is only considered in connexion with the fineness and specific gravity. Some years ago a vague specification would have required "the best heavy Portland cement;" to-day the description would probably be altered to "the best finely-ground Portland cement," provided, of course, that the author of such a vague description as the first could be induced to make any alteration at all. Several other tests have at various times been adopted, such as those made to ascertain the relative hardness of different cements, their resistance to transverse and crushing stresses, and their adhesive strength; these have their uses, but are seldom specified in England.

The colour of cement affords little evidence of its quality, as in many instances it is due mainly to the presence of iron. Sometimes, however, a yellowish hue is the result of under-burning, and if that be the case, the cement will prove comparatively weak, and may be unsound. As a rule, good Portland cement is of a bluish-grey or dark-grey colour, and is soft to the touch.

It is probable that in the near future a microscopic examination of Portland cement will be almost, if not altogether, sufficient to enable the observer to judge of its value; the researches of Mr. Alden H. Brown, of the University of Iowa, seem, at any rate, to point to this conclusion, but sufficient observations and experiments have not yet been made to obtain absolute proof of this.

When it is desired to test a consignment of cement, a small quantity should be taken from each of several casks or bags immediately on their arrival, care being observed that the cement is not taken from the outermost portion in the cask or bag, but from the interior. If the test is to be made by some one at a distance from the works, the sample should be carefully packed and sent as soon as possible. As a rule, not more than 25 lbs. of cement will be required for testing.

Weight.—The weight of Portland cement is stated in a well-known book to vary from 95 lbs. to about 130 lbs. per struck bushel. To-day manufacturers produce cements apparently more uniform in weight than these figures show. The chief causes of this smaller difference are the better knowledge which is now possessed of the ingredients of good cement, the more uniform degree of fineness to which it is ground, and also the greater care with which the weight is ascertained. The method of filling the measure has much to do with the apparent weight; it may be filled very lightly by allowing the cement to fall down a short shoot of easy slope, or may be more closely filled if the cement drop vertically into it from some height; or, still more compactly, if the measure be shaken during the filling. The necessity for some uniform and satisfactory method of ascertaining the weight has long been recognised, and various devices have been adopted for this purpose. In some cases the measure is filled from a short shoot, down which the cement slips at a moderate velocity. In others, the

albuminoid and other putrescible bodies in solution in the original sewage are converted into unstable compounds which also appear to undergo secondary decomposition with greater facility than they do in the original sewage, after being submitted to the chemical action of caustic lime; consequently, in reality the so-called purified sewage is worse than the original raw sewage, so far as secondary decomposition is concerned. Unfortunately, this state of affairs is not materially altered by subsequently filtering the lime effluent through any kind of filtering medium, either through land or specially-prepared filters of the very best construction. This is accounted for by the fact that the unstable organic compounds referred to are in solution, and also, of course, partially oxidisable; consequently, the land or the filter becomes rapidly choked by the deposition of the slimy, sticky, insoluble, gum-like substance already mentioned above, as being produced by the oxidation of organic matter in sewage. In my experience of the lime process, both with and without filtration, I can only confirm the already expressed opinion of other chemists, that the lime process is a delusion and a snare, so far as purification of sewage is concerned, and it ought no longer to be allowed to discharge its filthy effluents into streams in a populous district. It is an absolute failure. I have said that it is cheap, but if its adoption leads to subsequent costly litigation (as I have known it to do), its cheapness also is part of the delusion connected with it. Another most serious objection to the process is the putrescent character of the sludge and its increased weight. The organic matters mechanically carried down with the lime in suspension decompose more easily in the presence of free caustic lime than they otherwise would; therefore, before the sludge is removed from the tanks it is already in a state of active decomposition, and very foul. When this sludge is pressed in filter-presses, a putrid, foul-smelling water runs from the presses, which is very much worse in quality than the original sewage, and must be immediately dealt with if a nuisance is to be avoided. I may say here that I shall not consider the question of cost of any of the processes, although, of course, that is a very important consideration, but only the purely chemical side of the question. The cost must be ascertained by the engineer, and by the alliance of the engineer and the chemist, and in no other way can the great sewage problem be solved.

[We have not space for the remainder of Dr. Burghard's paper, which treated of other precipitation processes in some detail.]

Correspondence.

To the Editor of THE BUILDER.

DRAINAGE.

SIR,—Some years back I designed and carried out a mansion in Kent. At that time my house was the first on the estate, and there was no system of sewage near. Cesspool drainage was the only relief, and as my client had twenty-seven acres of land, I constructed the sewage tanks a considerable distance from the house. Twenty-two years passed (my client died in the meantime), and his son called and asked for a copy of the drainage plan, which was supplied. He returned it in a few days informing me that the plan was inaccurate, and that the system was wrong. "Well," I said, "you have taken a long time to make the discovery, and can't say who has tinkered the drains since I put them in. You have now a public system of drainage, but I could not connect the drains of your father's house, as in his time it had no existence."

My object, however, is not to tell this story, but to suggest that it may be well to adopt the custom, after testing, to have each line of drains photographed, and make a charge for the operation, give client and builder each a copy, and retain two copies to put away with the papers,—a course I am adopting. I state it for what it is worth. T. E. KNIGHTLEY.

106, Cannon-street, E.C., August 10.

DUST-EXCLUDING RESPIRATORS.

SIR,—Can any of your readers give the address of the manufacturers of respirators for excluding dust from the mouth of workmen and others in workshops and factories? These respirators have been long recommended for use by masons and others, but hitherto, I fear, without much effect. E. W.

cement is put into a coarse sieve from which it drops into a measure placed, say, 3 ft. below it. Mr. Henry Faija, M.Inst. C.E., has devised an apparatus which ensures uniformity of filling; the cement is placed in a hopper, from the bottom of which it passes into a trough; on turning a handle a worm in this trough revolves and gradually conveys the cement forward to an opening, whence it drops directly into the measure below. When the measure is filled full, the cement is struck off level by means of a straight-edge and then weighed; the weight of the measure itself, which has previously been ascertained, is deducted from the total, and the balance is the weight of the cement contained in the measure. Sometimes the measure in which the cement is weighed contains only part of a bushel, and this is another cause of discrepancy, for in a larger measure the cement is more compressed than in a smaller one, and the weight therefore appears greater. Mr. John Grant ascertained that 10-75 measures, each containing one-tenth of a bushel, were required to fill one bushel measure. In other words, if the weight per bushel were 107.5 lbs., the weight per tenth of a bushel would be only 10.75 lbs., which, multiplied by ten, would give an apparent weight per bushel of only 107.5 lbs., a difference of $\frac{7}{8}$ per cent.

The freshness of the cement has also a considerable influence on the weight. It has long been known that the storing of cement increases its bulk without corresponding increase of weight. This is due to the slaking, by the moisture of the atmosphere, of the quicklime or calcium oxide contained in the cement, and its conversion into the more bulky hydrate of lime. Therefore, the more thoroughly slaked the cement is, the less does it weigh per bushel. Some cements, of course, show considerably more increase in volume and decrease in weight per bushel than others. Experiments by Mr. Faija (see *Proceedings, Society of Engineers* 1888) showed that a cement which just after grinding weighed 120 lbs. per bushel, might when a few days old weigh only 112 lbs., or 114 lbs., when six months old 100 lbs., and at the end of a year not more than 95 lbs.

The weight of cement varies also according to its fineness. The finest cement, other things being equal, weighs the least. Mr. John Grant gives the weights of seven varieties, unsifted, and sifted through a sieve with 2,304 meshes per square inch. The average weight of the unsifted cements was 110.4 lbs. per tenth of a bushel, while the siftings weighed only 9.54 lbs. for the same quantity—a decrease of more than 13 per cent., or about 16 lbs. per bushel. Dr. Michaelis instances one excellent cement, which, as ordinarily ground, weighed 90 lbs. per cubic foot (about 115 lbs. per bushel), but which, when ground so that all passed a sieve with 32,000 meshes per square inch, weighed only 70 lbs. per cubic foot, or about 90 lbs. per bushel.

A higher degree of calcination yields a heavier cement, and the composition of the cement also affects the weight.

From this evidence it is clear that the weight of a cement, taken by itself, is no criterion of the cement's value. A heavy cement may be fresh, and coarsely ground; on the contrary, it may be well-burnt. A light cement may be under-burnt; on the contrary, it may be free from unslaked lime, and finely ground. Both may give equally good or bad results as to strength and stability. The weight is valuable only when taken in connexion with other particulars, but the best Portland cements, when received from the manufacturers, will be found to weigh within 5 per cent. (more or less) of 112 lbs. per struck bushel.

Specific Gravity.—Among engineers there has been, of late years, a growing idea of the importance of ascertaining the specific gravity of cement, but the variation in the specific gravity of different cements is so small that the very slightest error may lead to quite wrong conclusions. Mr. John Grant in 1871-80 declared that, in his opinion, it was not of much practical benefit; the specific gravity of thirty or forty cements, which he had tested, ranged from 3.135 to 3.040, the extreme variation being, therefore, less than 5 per cent. Other experimenters (Mr. Mann and Mr. Faija, for instance) have found greater variation, the specific gravity in some cases being as low as 2.7. Again, the specific gravity of some kinds of Portland cement is practically identical with that of blue lias lime, and this, in our opinion, throws considerable doubt on the value of the

test. Mr. Faija, in his valuable little book, "Portland Cement for Users," gives a table of the testing of fifteen samples of cement; from this table we extract the figures relating to two samples, which are almost identical in weight specific gravity, and fineness, but which differ, exceedingly in strength and hydraulic activity.

TABLE XII.

Variableness of Cement.

No.	Weight per bushel.		Residue per cent. after sifting through sieves, Nos.			Broke at lbs. per sq. in. of section at — days from gauging.			—
	lbs.	Specific gravity.	25	50	75	7	28	182	
3	111	2.99	4	21	32	510	647	772	Quick-setting.
10	110	2.90	1	21	31	382	401	450	Slow.

The tensile strength in each case is the average of ten briquettes, which were kept in water from the time of gauging. The table is interesting as showing that Portland cement must not be judged either by its weight or its specific gravity, or its fineness, or even by these three particulars taken together, but must be actually made into briquettes and broken before its character can be accurately determined.

Mr. Faija considers that the specific gravity should never be less than 2.92, but other authorities hold that cement a month old should have a specific gravity of 3.1 to 3.15. A high specific gravity, combined with extreme fineness, indicates that the cement is well burnt. A specific gravity of less than 2.9 indicates an imperfectly burnt or stale cement.

GENERAL BUILDING NEWS.

NEW BANK PREMISES AT BIRMINGHAM.—A new branch bank has just been erected for the Birmingham District and Counties Banking Company, Limited, at Hockley. The building has been erected at the corner of Hockley-hill and Well-street. The entrance doorway is placed at the angle of the two frontages. The style is Italian, the exterior being of brick and stone with a small quantity of terra-cotta. The facing bricks and terra-cotta were supplied by Messrs. King & Co., of Stourbridge; the stone is partly Hollington, and partly hard Derbyshire. The telling-room measures 33 ft. by 27 ft., and is 17 ft. 6 in. in height. The ceiling is of cement concrete. A large private room adjoining, and a strong room, &c., is also provided. The builders were Messrs. James Muffat & Sons. Mr. Cooper Whitwell is the architect. The same company have commenced the erection of a new branch bank at Aston Cross by the same architect, Messrs. James Smith & Son being the builders.

CATHOLIC APOSTOLIC CHURCH, WOLVERHAMPTON.—On the 2nd inst. the foundation stone of the new Catholic and Apostolic Church, in course of erection in Bath-road, Wolverhampton, was laid by the Rev. A. Inglis, B.A. According to the plans, there are two porches at the west end of the church and also an entrance at the east end, which is reserved for the priests and members of the choir. The baptistry and morning chapel are not included in the present scheme. The nave will consist of an arcade of five arches on each side, and will be 57 ft. 2 in. long, including the lower choir. The nave is 22 ft. wide between the piers, and is provided with benches for the laity, with a passage reserved down the centre about 4 ft. wide. The north and south aisles will be provided with chairs for the congregation; the total number of sittings in the nave and aisles being about 300. An organ-chamber is provided, together with a space for the choristers. The chancel, which consists of a portion of the lower choir, the upper choir, and the sanctuary, with an ambulatory, is about 40 ft. long and 22 ft. wide. The floor of the altar platform is furnished with mosaic pavement, from a design by the architect. All the external facings are executed in pressed sand-faced red bricks, and the stone dressings to windows, doors, &c., in white Hollington stone. The style adopted is Early Gothic. Mr. Henry V. Rising, of London, is the architect, and Mr. Henry Lovatt, of Wolverhampton, is the builder.

CO-OPERATIVE BUILDINGS, PLYMOUTH.—New central stores are being erected in Frankfort and Courtenay streets, Plymouth, by the Plymouth Mutual Co-operative and Industrial Society, Limited. The exterior is being built in red brick,

with Portland stone dressings. The building is five stories high, the height to the roof being 90 ft., while the tower over the main entrance rises to a height of 130 ft. To the building at present in course of construction there will be three main entrances. All the doorways will be of different character, with polished Peterhead granite jambs

and pilasters, and curved arches and pediments. The doorway at the corner of the two streets has an arch with a large carved keystone supporting an angle turret, which runs the whole height of the building. This arch will have carved figures in the spandrels. The ground floor will be occupied by retail stores, with the exception of the two main entrances to the upper part of the building. From each of the three entrances there is a staircase running the full height of the building, that to the Hall will be of stone, with iron girders. The first floor will be mainly occupied by show-rooms connected with the ground-floor businesses, and by the general offices of the society, including the manager's room. The second floor will contain the large hall, the dimensions of which are 80 ft. by 42 ft., and on this floor there will also be committee-rooms and additional offices. The hall will comprise library, reading-rooms, and recreation-rooms. The fourth story contains some additional store-rooms or work-rooms, and a residence for the caretaker. In the centre building there will probably be three lifts,—two in the portion now in course of construction. The architect of the building is Mr. H. J. Snell, of Plymouth, and the contract for the shell of the building was let in 1889 to Mr. A. R. Dobson, also of Plymouth.

NEW BREWERY, TOTENHAM.—Messrs. Reed, Bight, & Co. (Limited), contractors, Plymouth, have been selected (without competition) by Mr. W. Bradford, brewers' engineer, for the erection of an extensive brewery at Tottenham for Mr. H. B. Woodridge. The work is to be proceeded with at once.

NEW MARKET HOUSE, BILSTON.—On the 9th inst. the new Market House at Bilston was opened by Sir Alfred Hickman, M.P., J.P., &c. The building is of pressed red bricks, with terra-cotta facings, and was designed by Messrs. Horton & Co., of Wednesbury, and the walls and roof were built by Messrs. Dorse & Sons, of Cradley Heath, at a cost of 4,819*l.* 11*s.* 6*d.*, including extras. The shops and stalls were built from plans and specifications prepared by C. L. N. Wilson, C.E., Township Engineer, the contractors being Morrell Bros., of Bilston, their price being 1,760*l.* The hall is 300 ft. long and 65 ft. wide. There are forty-five lock-up shops: eleven for butchers, provided with hanging-rails, sliding-pulleys, &c., and ash blocks; eight fish-shops are provided with white marble slabs and enamelled brick fronts, water being laid on to each fish-shop, which is also drained separately. The remaining twenty-six shops are for general goods; there are also forty lock-up stalls and fifty-five open stalls, complete with market-inspector's office, store-room, &c. The concrete floor was laid by Mr. Wilson, with his own men, at a cost of 529*l.* 8*s.* 10*d.* The whole of the building is lighted with the electric light. The boiler is one of Davey, Paxman, & Co.'s "Loco" type. The engine is Robey's 9 in. by 8 in. cylinder horizontal, making 250 revolutions per minute with 80 lbs. steam. The whole of the electric lighting plant was put down by the Brush Electric Engineering Co., London (Manchester Branch), under the supervision of Mr. Wilson, C.E., Township Engineer, who designed the engine and boiler-houses which were built by Messrs. Morrell Bros. The electric lighting plant cost about 750*l.*, making the total cost 7,558*l.* 11*s.* 7*d.*

BRITISH ARCHEOLOGICAL ASSOCIATION.—The forty-ninth annual congress of this Association is to be held next week at Cardiff.

SANITARY AND ENGINEERING NEWS.

SEWAGE DISPOSAL WORKS, CASTLE CARY.—The first and the whole sewerage disposal works, Castle Cary, Somersetshire, was cut by Mr. F. S. Moore, of Castle Cary, on the 27th ult. The undertaking comprises an extension of the present sewer to about half a mile farther from the town. At the outlet there will be constructed four large settling-tanks, sludge well, and four large filter-beds, the effluent being finally passed over about five acres of land, which will be specially prepared by deep drainage, for the purpose of purification before its discharge into the river. The cost, including the purchase of land, will be about 3,000. The works have been designed by Mr. E. Cousins, C.E., of London; and the contractors are Messrs. Francis, of Castle Cary.

WEYBRIDGE SEWERAGE.—At a meeting of the Chertsey Rural Sanitary Authority, on the 2nd inst., Mr. W. H. Radford, C.E., Nottingham, was appointed engineer for the sewerage and sewage disposal of Weybridge and Otlands, and was instructed to prepare plans and estimates for submission to the Local Government Board. It is proposed to collect the whole sewage of Weybridge, whence it will be pumped to the sewage-disposal site on Hollick's Farm, in Chertsey parish, and there purified by chemical precipitation in tanks, followed by filtration through twenty-eight acres of land.

THE ABSORPTION AND FILTRATION OF SEWAGE ON SANDY AND OTHER SOILS.—To Section G of the British Association, Mr. Richard F. Grantham, M. Inst. C.E., submitted a paper on this subject. The author refers to what were described as the remarkable results of the experiments conducted for the last two years at St. Lawrence by the Massachusetts Board of Health upon the filtration of sewage. The results are compared with instances of sewage farming upon sandy soils. The examples of sewage irrigation at Edinburgh, Danzig, and Berlin are described, and the effect upon the sandy soil in each case, as well as the average quantity of sewage treated per acre per day, is alluded to. The particulars of the filter tanks constructed and the materials used by the Massachusetts Board in their experiments are stated, and a table is given to show the quantities treated and the effect upon the nitrogenous matter. The tanks were 6 ft. deep, built water-tight; 17 ft. 4 in. in diameter at the top and 16 ft. 8 in. at the bottom. Two-inch drain-pipes and a thickness of 1 ft. of gravel and sand, decreasing in coarseness upwards, were laid and spread at the bottom. Above this layers of sand and of gravel and other materials were placed in several tanks. The sewage was delivered on to the surface of the filters intermittently. The volumes of sewage dealt with in sewage farms are contrasted with the quantities experimented upon, and Dr. Frankland's experiments for the Rivers Pollution Commissioners are shown to corroborate the results of the Massachusetts Board's investigations as regards the quantities and degree of purification. The action of the filters is shown to be not merely in straining the sewage, but in consuming and destroying the organic impurities, and this action is due to the presence in it of organisms which require a supply of oxygen for their existence and multiplication. The interstices in the sand and gravel afford air-spaces for these organisms to multiply; but top soil and mould retain so much moisture that, although the bacteria are filtered out, a large percentage of albuminoid ammonia is left in the effluent. From the quantity of sewage disposed of on the Berlin sewage farm per acre and from that ordinarily absorbed by intermittent downward filtration are calculated the areas of land that according to the same ratios would be required for the disposal of the London sewage, and these are compared with the space required for the volume according to the ratio shown by the experiments. It is suggested that there would be no difficulty from the nature of the formation of the Maplin and Foulness Sands, in reclaiming and underdraining them and laying them out for filtration areas.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, THORNBURY CHURCH, GLOUCESTERSHIRE.—On the 31st ult. a stained-glass window which has been placed in the south aisle of St. Mary's Church, Thornbury, to the memory of Mr. Joseph Young Sturge, was unveiled. The window, which has been erected by Mr. A. O. Hemming, of London, represents Our Lord blessing tiny children.

DECORATION OF CHRIST CHURCH, ASHTON-UNDER-LYNE.—According to the *Manchester Courier*, the decoration of Christ Church, Ashton-under-Lyne, has just been completed by Messrs. R. Bennett & Co., of Manchester. The general colours of the nave are cream and terra-cotta grounds enriched with stenciled ornaments in moss greens, ambers, &c. The spandrels of the arches contain emblems in foils, surrounded by foliage, &c. The

tones of the chancel are richer, gold being freely used. The chief figure-subject is that above the chancel arch, which depicts Christ seated on the throne in glory, surrounded by attendant angels. The work over the east window represents the descending Dove. The picture of the Good Shepherd is contained in an oblique panel at the foot of the chancel arch. These three pictures are executed in sienna monochrome. The six panels of the east wall on either side of the altar are treated with figures in natural colours on gold ground, and represent angels in varied ministrations. The whole of the figure work has been executed by Mr. H. G. Hillar, of Manchester.

STAINED GLASS WINDOW, ASTON CHURCH, ROTTERHAM.—A stained-glass window of two lights, illustrating the subjects of The Baptism and Resurrection of our Lord, has been inserted in this church. The window is the gift of Miss Senior, of Aston Common, and was designed and executed by Messrs. Warrington & Co., of London.

FOREIGN AND COLONIAL.

FRANCE.—The work of enlarging the Paris, Lyons and Mediterranean terminal station is to be commenced shortly. According to the scheme approved by the Minister of Works the existing station buildings will be retained and prolonged along the Rue Bevy, which will be displaced. The cost is estimated at 16 million francs, 5 millions being for compensation to owners of property disturbed. The enlargement of the Ecole de Droit will also be commenced shortly. 1,233,000 francs will have to be expended in the purchase of property. The work, which will be commenced on the 22nd of this month, will involve the demolition of all the houses between Rue St. Jacques and Rues Soufflot and Cujas. The Government has offered to the Luxembourg Museum a fine picture by M. Fauch-Latour, which obtained a great success in the Salon of 1879. It is entitled "Un Atelier aux Batignolles," and includes the portraits of MM. Zola, Manet, Renouard, Alfred Assolant, Paul Verlaine, &c.—A Committee has been formed at Montauban to raise a monument to the novelist Léon Cladel, recently deceased.

THE JURY of the International Exhibition of Fine Arts at Munich have awarded first-class medals to the following French painters: MM. Aimé Morot, Rochegrosse, Ball, Henri Martin, David, and Millet, as well as to M. Lamiet (sculptor) and M. Leterrier (engraver).—The jury of Architecture at the Ecole des Beaux-Arts has given judgment in the competition of students of the first-class, and has awarded second medals to MM. Lefebvre, Umbenstock, Boucher, Renavay, and Callet.—The military authorities have commenced the work of dismantling the ancient fortifications of the town of Arras, beginning with the Porte Baudimont.

BUDAPEST.—There is great activity in the building trade here this year, owing to a large number of business premises being in course of erection. These buildings, generally situated on the great radial thoroughfares of the city, show facades which, thanks to their careful architectural treatment, deserve more attention than similar ones to be found in other Continental capitals.—The number of palatial residences in course of erection is small, as the majority of the Hungarian magnates have now seen the completion of their new town residences. The few palaces not yet completed for the most part belong to the Catholic prelates, who have but lately decided to compete with the aristocracy in the beautification of the town.—As regards the many public buildings, the new Houses of Parliament are the only ones of any importance yet in the hands of the builder. The gigantic block, the very difficult foundations of which were commenced in 1887, will probably take some six years to complete. The design, which was selected in competition, is Herr Steindl's, the style selected being Gothic. The site is a most admirable one, and as the frontage measures 265 metres, and the height of the main cupola is 110 metres, the block,—especially when seen from the river,—cannot fail to be a most imposing one.—The Leopold Cathedral, the facade and cupola of which can at last be said to be finished (the sculptural ornament even being *in situ*), seems to be making but slow progress, as far as inferior decoration is concerned. It is, indeed, difficult to determine if this Cathedral or the so-called Marble Cathedral at Copenhagen shows the least amount of progress annually. Both Budapest and the Danish capital might at least make some effort to complete their most prominent pieces of church architecture.

DRESDEN.—The so-called "International" Exhibition of Water-colours opened here is regarded as a success.—The Semper Exhibition, which will be opened here in connexion with the unveiling of the Semper monument, and the visit of the architect attending the biennial gathering at Leipzig, promises to be a very interesting one. Some four hundred sketches, which were in the hands of rela-

tives of the deceased architect, [have] already arrived, and a large contingent is yet expected from the various Government offices in which Semper has worked.—Among the number of interesting public buildings which the visitors from Leipzig will see is the new home of the Royal Academy of Arts, on the Brühlische Embankment.

MISCELLANEOUS.

DETERIORATION OF WATER IN DIRTY CISTERNS.—The cleansing of cisterns and water-tanks, a thing never to be safely neglected, calls for special attention at this season of the year, and Dr. W. Sedgwick Saunders, the Medical Officer of Health to the City, did well in enforcing its necessity in his last report to the Commissioners of Sewers. Too often, however, there are insuperable difficulties in the way, owing to the inaccessible position in which the cistern is placed, due to the neglect of the water companies to enforce the provisions of their own regulations—one of which, the 13th, requires that the cistern shall be placed in such a position that it may be inspected and cleansed. It is by no means uncommon to find the cistern placed under the floor of a bed-room, over a water-closet which it also supplies, or in the roof; and, when in the latter position, not seldom without a cover, contrary to the requirements of the same regulation. The companies have been remiss in carrying out what we may call the sanitary provisions of the regulations, and we may instance the 14th, which provides for the removal of waste-pipes connected with drains. For twenty years they have had the power, by serving a simple notice, to effect this sanitary improvement, but have never been induced to do it, although the necessity of the step was constantly impressed on them by the late Water Examiner, Sir Francis Bolton, and, some years ago, by the Local Government Board also. It is of little avail that they supply well-filtered water if it is allowed, as so frequently is the case, to become contaminated in filthy and neglected receptacles. The matter is one well deserving of the attention of the sanitary authorities, whose hands, we hope, will be strengthened shortly by the By-laws for the purpose which they are authorised to make under the provisions of the Public Health (London) Act, 1891.—*British Medical Journal.*

THE AMERICAN OUTPUT OF PIG-IRON IN 1892.—It has been repeatedly urged by American trade papers that the present output of pig-iron in the United States is far too large for consumption, and that furnaces should be blown out. From statistics just published by the American Iron and Steel Association, it appears that there were blowing on June 30 last, 256 furnaces, against 313 furnaces on December 31, 1891. Although the number of furnaces in blast on June 30 last was thus fifty-seven less than at the close of 1891, the smaller number produced almost as much pig-iron in the first half of 1892 as the larger number in the second half of 1891. The statistics, received direct from the manufacturers, show that the total production of pig-iron in the United States during the first six months of the current year was 4,799,056 tons, which, compared with the production of 4,911,763 tons in the second half of 1891, exhibits a decrease of only 112,707 tons. Adding together the production of the two half-years, there is the extraordinary output of 9,710,819 tons in twelve months, which is 508,116 tons in excess of the production of 9,202,703 tons in 1890, the largest ever previously recorded. The American production in the twelve months of 1891 fell below that of 1890 because of the serious interruption to furnace activity, owing to labour troubles, in the first half of 1891, when only 3,308,107 tons were made, the total output for the year being 8,279,870 tons. The result of the great furnace activity in the first six months of 1892 has been an unheard-of accumulation of stocks of pig-iron, which on June 30 last amounted to 737,946 tons, the effect of which has been the great depression now prevailing in the American iron market.

LIVERPOOL ENGINEERING SOCIETY.—It is announced by the Hon. Secretary of this Society, with reference to the remainder of the summer excursions of the Society, that it has been decided, owing to the visit of the members of the Iron and Steel Institute to Liverpool next month, to amalgamate the intended visits of the Society to the Mersey Aqueduct Tunnel, Norton Water Tower, Liverpool Overhead Railway, and Hydraulic Power Company's Works with those of the Institute.

SMOKE FROM DOMESTIC FIRES.—In Section G of the British Association, a paper on "A System of Purifying the Smoke from Domestic and other Fires" was submitted by Colonel E. Dulier. This process consists in mixing the smoke as it leaves the fire with a small quantity of steam, generated in a boiler forming part of the kitchen range. The mixed steam and smoke pass into an open chamber, the top part of which is provided with a number of pipes, placed in the direction of the prevailing wind, through which the air passes and helps to cool the gases. At the extreme top of this chamber,

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*Fowls Hall	Walsall Corp.	100, 750, 125, 52, 125.	Nov. 12

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Painting Works, &c. Fier and West Wood	Not. Asylum Board.	Official	Aug. 22
*Tarpauline Playground	Edmonton Union	T. E. Knightley	Aug. 22
*Two Reservoirs, &c.	Montgomery T. Co.	Official	Aug. 24
*Service Tank, Laying Pipes, &c.	Bishop's Castle T. Co.	W. Wyatt	do
*Twenty-eight Workmen's Cottages, Ystrad Rhondda, S. Wales	Rodringsill Bldg. Club	do	do
*Alterations at Workhouse	Kensington Quars.	T. W. Aldwinkle	Aug. 25
*Alterations, &c. Baptist Chapel, Oswestry	do	T. Roderick	do
*Aberaman	First Tontrefald Bldg. School Board	do	do
*Twenty-one Cottages, Tontrefald, near Pontypridd	Manchester, Shemeld, & Litch, Ry. Co.	do	do
*Stonemasonry and Stables, Glossop and Grimsby	Walhampton L. B.	Official	do
*Residence and Stabling, Moorstown, near Leeds	G. F. Dabry	do	do
*Sewerage Works	D. W. Robinson	do	do
*Alterations, &c. Maplewell Church, Newcastle-on-Tyne	Oliver & Leeson	Aug. 26	do
*New School for Infants	R. Churchill	do	do
*Crescent Wood Paving Works	Burton-upon-Trent School Board	do	do
*Granite Channelling and Kerbs	Parham and Hardy	do	do
*Extension of Workhouse	Wintley School	Mr. Stapley	Aug. 31
*Steam and Hot Water Works	Sandwich Corp.	A. J. Cull	do
*New Brick Bridge, &c.	Barnet Union	W. H. Maudbridge	do
*Police Station and Court, Stanfitham, Newcastle-on-Tyne	Wood Green L. B.	do	do
*Drainage Works, Willington	Standing Joint Com.	J. Creswell	Sept. 5
*Pumping Engine Station, &c.	Corp. of York	G. A. Wallis	do
*Extension of Asylum	Poplar and Stepney Sick Asylum	Official	Sept. 5
*40,000 Jarrah Wood Blocks	St. George's Hospital	A. & C. Harston	Sept. 6
*Road Materials	Entry, Southwark.	Official	do
	Brunley Local Board	do	do

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv., vi., viii., & ix. Public Appointments, p. xx.

CONTRACTS.—Continued.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Works at Relief Offices	St. Mary (Lillington) Guardians	W. Smith	Sept. 8
*Three Galvanic Batteries, &c.	South Metropolitan School District	H. Spooner	Sept. 12
*Additions, &c. to Cape Hill Asylum	Asylum Committee of London G. Co.	C. H. Howell	do
*Erection of 40 Houses, Leeds	North Eastern Ry. Co.	W. Ball	Sept. 14
*Widening Railway, Leeds and Selby Branch	do	H. Coppenhalls	do
*Furniture Room, Dulwich Park	London County Council	Official	Sept. 27
*Lodge, Convent, &c. Hamstead	do	do	do
*Mine Kip, Dock, Sewer, &c.	do	do	do
*Steel and Iron Bridge over River Ure	do	do	do
*Erection of School Buildings	Law and City Corp's Com. of Corp. of City of London	do	do
*Three Houses, Cambridge	Public Hall, Club, Library, & Chambers near Swanage	J. Sargent	Oct. 3
*Widening School, Bideley, near Looe	do	Walker & Mosham	do
*School Buildings, Old Trinton, New-ent	do	Walker & Collinson	do
Covering Steam Boilers and Pipes	C. H. Cowens	do	do
School Chapel, Blaydon-on-Tyne	Verand Gas and Water	Official	do
Schools, Teachers' Houses, &c. High Spenn, co. Durham	do	W. L. Newcombe	do
Extension of Co-operative Store, near Charter-Street	Chopwell (Newcastle-on-Tyne) Sch. Bd.	S. Oswald & Son	do
Alterations, &c. "Fox and Ground," Crookley, Newcastle-on-Tyne	do	do	do
Houses and Sculleries, Rowlandsbury, Leeds	do	Oliver & Leeson	do
Leeds	J. T. Finney	do	do
*Wardens' Quarters, Colchester	War Department	Smith & Tweedale	do
	do	Official	do

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Clerk of Works	Lionel Union	£200	Aug. 24
*Assistant Engineer	Edinburgh of Bury St.	£1,000	Aug. 27
*Surveyor	Bromley Loc. Bd.	£200	Aug. 29

FRIDAY, AUGUST 20.

British Archaeological Association.—Annual Congress, Cardiff (continued).

SATURDAY, AUGUST 27.

British Archaeological Association.—Annual Congress, Cardiff (concluded).
Glasgow Architectural Association.—Visit to Dunblane Cathedral.

LEGAL.

ARBITRATION CASE.

WE are informed that some months since Messrs. Reed, Blight, & Co. (Lim.), of Plymouth, the contractors for the erection of the Palace Hotel, Bournemouth, sent in a claim to the architects, that building, Messrs. Hoyer & Hunt, amounting to 7,300*l.* for extra and omitted works up to and including the roof. After considerable delay, the architects certified that 1,026*l.* only was due in full and final settlement. Thereupon the contractors proceeded to lay the matter before Mr. Macvicar Anderson, the President of the Royal Institute of British Architects, the arbitrator named in the contract. After a patient inquiry, held at the Surveyors' Institute, Great George-street, Westminster, the arbitrator has, we hear, awarded the contractors the sum of 6,612*l.* 13*s.* 9*d.*

MEETINGS.

SATURDAY, AUGUST 20.

Architectural Association.—Annual Excursion, Taunton (concluding day).

MONDAY, AUGUST 22.

British Archaeological Association.—Annual Congress, Cardiff.

TUESDAY, AUGUST 23.

British Archaeological Association.—Annual Congress, Cardiff (continued).

WEDNESDAY, AUGUST 24.

British Archaeological Association.—Annual Congress, Cardiff (continued).

THURSDAY, AUGUST 25.

British Archaeological Association.—Annual Congress, Cardiff (continued).

just before passing into the atmosphere, the gases are met by a very fine shower of water issuing from minute holes in a pipe. The result of this treatment is a very thorough washing of the smoke, and the almost complete removal of all solid matters (soot and dust) and a large proportion of the sulphurous acid always present in coal-smoke. The removal of the soot and dust is so perfect that a piece of wet cotton held in the issuing gases remains perfectly white even after a lengthened exposure. The amount of steam required is small, and may be neglected in an estimate of the cost of working the process, as it is generated by means of heat which would not otherwise be available for any useful purpose. The only item of cost to consider is that of water. The amount used in the apparatus at Sloane-gardens is found to be about 10 gallons per hour; this includes the condensed water from the steam. This apparatus treats the smoke from a large kitchen-range burning about 20 lbs. of coal per hour, but it is capable of treating the smoke from several such fires. The draught is not sensibly impaired by the apparatus, any slight retarding of the flow of the gases being more than compensated by the action of the jet of steam. The results of a number of experiments with the apparatus at atmospheric temperatures varying from 92 deg. Fahr. (33.3 deg. C.) in the shade (part of the time the apparatus was exposed to direct sunshine) to 50 deg. Fahr. (10 deg. C.) showed that almost the whole of the soot was removed, and a considerable proportion of the sulphurous acid. The apparatus was said to be exceedingly simple to work, being, in fact, almost automatic.

CAPITAL AND LABOUR.

WAGES PAID AT THE HOMESTEAD WORKS.—There exists considerable misapprehension as to the wages paid at the Homestead Works of the Carnegie Steel Company, as well as to the cause which led to the strike and its lamentable results. According to the sworn statement made to a Congressional committee by Mr. H. C. Frick, Chairman of the Company, the wages earned during May by the men at Homestead, working only eight hours per day, were 3*s.* 8*d.* per hour, 1*l.* 9*s.* 8*d.* per day, or 45*s.* per annum. The highest wages were made by the rollers, who earned 6*s.* 4*d.* per hour, 2*l.* 10*s.* 6*d.* per day of eight hours, or 757*l.* 10*s.* per annum of 500 working days; the lowest by the crumblers, who earned 2*s.* an hour, 16*s.* per day, or 240*l.* per annum. As to the cause of the strike, it appears that, owing to the introduction of the newest machinery for rolling armourplates at the Homestead Works, the workmen were able to

turn out 60 per cent. more steel than with the old machinery. The Company offered to divide the saving thus effected with its workmen, as had been accepted under similar conditions at another of Messrs. Carnegie's works; but the Homestead men, acting upon the advice of their leaders, declined the offer, and foolishly struck.

15,347.—SANTARIY DWELLINGS: W. Van der Heyden.—This is one of the latest inventions in the construction of houses which will enable people to live in the coldest climates and in the hottest countries, being at the same time perfectly hygienical. The mode of carrying this out can only be adequately understood by reference to the very detailed specification and drawings.

15,509.—ARTIFICIAL STONE: G. Dolenz.—In carrying out this invention, the inventor employs for the production of plain or uncoloured artificial stone from 4 to 5 parts of finely-ground burnt magnesite, 2 to 3 parts clean, washed crystal sand, and 4 to 5 parts 34 per cent. chloride of magnesium-lye. These ingredients are intimately mixed together to form a pasty mass, which may either be spread out to the desired thickness on a glass table, or poured, whilst stirred, into a suitable mould previously washed with water. It is then placed in a chamber to be dried by exposure to a constant temperature of 80 deg. R., during about twenty hours. When it is desired to produce veined stone or marble, a mixture of the above is made, which is coloured with an earth colour corresponding to the kind of stone or marble to be imitated. This coloured mixture is added to that first described, and the two are stirred together, preferably by means of a round wood bar. In order to obtain a beautiful veiny appearance, the uncoloured mixture is made thinner than the coloured mixture. In this way the latter is distributed in a threadlike or vein form in the thinner substance. The coloured composition is then treated in the manner described for the uncoloured stone or marble.

7,690.—WALLS AND PARTITIONS: G. Hayes.—This invention relates to improvements in the construction of walls and partitions for buildings, and consists of different combinations of corrugated sheet metal as a foundation, with metallic or resin form in the thinner substance. The foundation, and upon which plaster may be applied and securely held.

7,941.—STONE-CUTTING: P. C. Gerard.—This invention relates to the cutting or sawing of all kinds of stone, granite, marble, and other like hard substances, and particularly to that class of machine in the thinner cutting operation is effected by means of diamonds set into bits on diamond holders, which are attached to an endless screw running over two pulleys. The improvements mainly consist of a machine comprising various

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E. Calfley	18,549	W. J. Madlison	16,887
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Transey.

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Lindsay 1,465 0
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* Accepted.

LONDON.—Accepted for sundry works in extending the Baywater death inland schools. Messrs. N. S. Joseph & Southam, architects, 45, Fishbury-pavement, E.C.—

S. Barnett £350 0 0

LONDON.—For decorative work at No. 21, Pembroke-villas, Baywater. Messrs. N. S. Joseph & Southam, architects, 45, Fishbury-pavement, E.C.—

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W. Harrison	435			

[All of St. Helens.] * Accepted.

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A. H. White	2,467			

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* Accepted.

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The Builder.

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Old Scarborough.



THE *Builder* of July 16 contained a report of the excellent paper on "The Municipal Engineering of Scarborough," prepared by Mr. Joseph Petch, the Borough Surveyor, and of that by Mr. Millhouse on the Water Supply, which were read before the members of the Incorporated Association of Municipal and County Engineers, who met at that town on June 11. The following account of the old town of Scarborough, the history of its growth, and the names and direction of its ancient thoroughfares, may prove a not unacceptable supplement to these clear and well-arranged reports.

The old town of Scarborough occupies a wide, shallow scoop on the southern side of the hold promontory running far out eastward into the German Ocean, the lofty, rocky extremity of which is occupied by the ruins of the Norman Castle, from which the place takes its name (the "Burh," or stronghold on the "Scar," or cliff), and the hideous modern barracks, with which our military authorities have, according to their wont, disfigured one of the noblest sites in the British Islands. This scoop has the sea as its boundary on the north and south; the castle-headland towers up above it on the east; on the west the ground rises gradually and falls again to the deep valley which separates the old town of the fishermen, sailors, and shopkeepers from the Spa on the South Cliff, with its terraces, churches, and hotels. In the memory of those still living, there was not a single residence on this side of the valley, which has now become the favourite resort of summer visitors.

Through the old town in former times a little streamlet, or beck, known as "Mill Beck" and "Dam-Geth," ran from the north-west corner in a south-westerly direction, and entered the sea under the Castle Hill not far from the Custom House. Rising near the present Atlas-place, the stream crossed St. Thomas's-street, Queen-street, to Cross-street,

in the middle of which a very distinct depression marks its course, and Dimple-street, where we may safely place the Castle Mill, the name of the street being derived from the "Dun-pool," *i.e.*, the pool or head-water of the mill under the shadow of the "Dun" or hill fort. The place of this mill-pool is shown by a hollow of swampy ground, crowded with low lodging-houses, registered for various numbers of inmates, from thirty-two up to sixty, the sanitary character of which is not improved by the boggy subsoil. The miller in old times must have driven a profitable trade, and made money. Reginald the miller, "Molendarius," in Edward II.'s days, was able to give a piece of land adjacent to his mill to the Franciscans, whose convent stood near. The brook was crossed by a bridge at the upper end of St. Sepulchre's-street. Besides "Mill Beck," this stream had the name of "Dam-Geth," of which it is hard to make anything satisfactory. Is "Geth" another form of "gowt" or "goat,"—a water-course, the stream being kept back by a dam for the purposes of the mill? Another stream ran down the valley to the south of the town, where were several more mills. We find mention of five mills altogether in Scarborough.

The first beginnings of the town of Scarborough were on the high ground immediately to the west of the Castle. Here was the Aldborough, or Old Borough, the name of which is preserved in Aurborough-street, running from the North Cliff southwards, the lower part being known as Cross-street (ancient Carr-street), from the Market-cross which formerly stood at the bottom, and communicating with the shore by the rapid descent of Bland's Cliff. The "Aldborough" was defended on the north, where the steepness of the cliff rendered any assault from the sea impracticable, only by a moat and earthen mound, the traces of which have but recently been obliterated by building. On the west or land-side there was a wall running down Aurborough-street and Cross-street, where it was met by another wall on the south running along Merchant's-row and Nether Westgate, and ending at the foot of the Castle Dykes. By the time of Henry III., the Old Borough had received the addition of the New Borough, enlarging the town to the west. That

sovereign in 1256 confirmed the enlargement of the borough by the addition of Whalesgrave, the present Falsgrave. The northern moat and mound were prolonged westwards, as a defensive work, to the northern end of Bar-street, from which point they were continued southwards to St. Nicholas Cliff. The new defence was strengthened on the northern side by Richard III. with a stone wall, built "quadrato saxo," portions of which remained until early in this century. He also erected a Bulwark on the shore to the south-east, which in Leland's time was "yn ruine by the se rage." The same old topographer says,—"The town standeth wholly on a slaty cliff. Where it is not defended by the sea it is walled a little with stone, but mostly with ditches and walls of earth." There were only two gates of entrance, Aldeburgh Gate, to the north, which Leland describes as "very base," and Newborough Gate to the west, "meetly good."

An old view of "Aurborough Gate," given in Baker's "History," undated, shows it reduced to a mere fragment,—just the chief archway and the smaller side archway, both pointed, and the wall connecting them, all the upper part having perished. The oldest view of Newborough Gate, in recent times known as "the Bar," shows a narrow arched entrance, without any architectural pretensions. Outside it was a drawbridge over the moat. The gate and gate-house were rebuilt in 1642, as the town gaol. There was only one wide central archway, which served both for wheeled vehicles and for foot passengers. Under the archway were grated windows opening into the prison, through which tobacco and spirits and other articles were passed to the prisoners within. In the oldest view of the town a gallows with a man hanging on it is seen a little way outside the gate. The name "Gallows Close" appears in the old town books. Another instrument of punishment, the pillory, was set up in the middle of Newborough, opposite to King-street and Queen-street. The gate and prisons having been pulled down, a new "Bar" was erected in 1843. It was a wretched imitation of Medieval work, which, being utterly devoid of architectural merit and proving a great obstacle to traffic, passed away unregretted two years ago.

The street known as Newborough, which this gateway spanned, with its modern continuation of Eastborough towards the quay, and Westborough towards the railway station, forms the chief thoroughfare of the modern town, lined with shops and places of business, and hotels and houses of refreshment. It is of good width, and has the picturesqueness a street always presents when the houses are of different date and style, and of varying height, with an abundance of how-windows. The lower part, or Eastborough, is virtually a new street, formed between forty and fifty years back, absorbing a large part of the old thoroughfares of Merchants-row and Palace-hill. Here the houses are all of one design on both sides of the street, to the loss of all picturesqueness. Another chief thoroughfare, more to the north, running from east to west through the centre of the old town to Castle-gate, parallel with Newborough, was originally known as the "King's Highway," but for many centuries it has borne the name of "Westgate," divided into "High," or "Over Westgate," and "Long Westgate." Parallel to it to the south was "Nether Westgate," which has been subsequently dignified by the appellation of Princess-street, opening at the eastern extremity into "Castlegate." Between Eastborough and Long Westgate St. Sepulchre-street takes a bending course, having its name from the church of the Knights of St. John of Jerusalem (afterwards granted to the Franciscans) which formerly stood in it. These main thoroughfares are crossed, gridiron fashion, by other streets and lanes running down the southern slope of the headland, and mostly very steep towards the upper end. Going eastwards from Newborough Bar, we have North-street, St. Thomas-street,—so-called for this church, or rather Chapel of Ease, dedicated to St. Thomas of Canterbury, at its lower end, just inside the Bar,—Queen-street, originally Blackfriars Gate, from the house of the Dominican or Preaching Friars on the east side, the memory of which survives in "Friars'-entry"; Aunborough-street, continued under the name of Cross-street, formerly Carr-street, to Newborough and Toller Gate, a prolongation of Dumble, or Dun Pool-street northwards. The name "Toller Gate" is derived from the market which in early days used to be held on the brow of the North Cliff, where Rutland-terrace now stands, under the shadow of the Castle walls, to the lord of which all who held stalls had to pay a toll or rent. The whole of the locality for some distance along the cliff-edge, as we see from old maps, bore the name of Toller Gate; Castle-road was Upper Toller Gate; and the fields on the slope below were called the Toller Gate Closes. A large stone, now at the museum, removed from this place, known as "the hlus stone," was, traditionally, that on which money used to be paid and bargains ratified. Continuing further to the east, we come to the steep ascent of St. Mary's-street, leading to the "Church Stairs," and by them to St. Mary's Church and Castle-gate, the upper ends of the two being united by "Paradise," just below the barbanic of the Castle. This place has its name from a large gabled mansion so called standing in a spacious walled demesne, with a full southerly exposure, and commanding a glorious view over the whole bay. The house has been long since demolished, nor is there now anything specially "paradisical" on the spot to warrant the title.

It will have been noticed that many of the above-named thoroughfares are called, not "streets," but "gates." We may add to the list "Flesher Gate," now Globe-street, and "Preaching Friars Gate," East and West Sandgate, and others. This is a distinct mark of Scarborough being a Danish settlement. Wherever we find a "gate" used, not for that which one goes through, but which one goes along,—not *perita*, but *via*, as in the "gates" of Leicester, Derby, York, Lincoln, &c.—we may be certain that it is a place which the Danes settled in and made their home for many successive generations. In such locali-

ties what we now call "Gates" are called "Bars," as "Micklelegats Bar" (which in modern parlance would be "High-street Gate"), and the other "bars" at York, and the recently destroyed "bar" at Scarborough. Local boards have a sad habit of altering old street names, and fixing modern titles on ancient thoroughfares. Such tampering with old memorials ought to be steadily resisted. As we have seen in the case of Dumble-street, much of the history of our old towns is written in their street names, and to change them is to efface it. As often as not the change is a mere piece of flunkeyism, intended to do honour to some great personage of the day, who, as time passes on, is usually entirely forgotten, while the historical loss is permanent. "Blackfriars Gate," and "Nether Westgate" would still tell their own tale, while "Queen-street" and "Princess-street," which have been substituted for them, are now utterly unsuggestive. Who knows what queen and what princess they were intended to do honour to? The name King-street was actually substituted to match Queen-street opposite, for the old "Helperby-lane," in 1801, on the petition of a schoolmaster, who had his seminary there, and thought the vulgarity of the name injured his school. *En revanche*, St. Nicholas-street has resumed its old name, taken from the church on the cliff, to which it led, the very site of which has been washed away. When the Assembly Rooms, known as "the Long Room," were moved up from the shore to the site of the Royal Hotel, this street became "Long Room-street," by which it was known till a recent period. Among the historical street-names happily still unchanged is "Tut Hill," on the lower slope near the Castle, parallel with Nether Westgate and Long Westgate. The meaning of this name, found in many other towns, is not so well known as it ought to be. Its origin has been foolishly sought in the name of the Scandinavian god *Taut*. We need not, however, go to heathen mythology for its root, which lies much nearer home. A tuthill or tooth-hill was a look-out post, a very necessary appendage in former days to a castle or monastery, or any place liable to hostile invasion. There is a "toothill" attached to the monastery at Peterborough, another in the gardens of the deanery at Rochester. The "toothill," from which Touthill fields at Westminster takes its name, was only removed when the place was laid out for building, and the Chapter accounts contain a record of the operation, how long it took, and what was paid for it. The use of the word in the vernacular is shown in Wycliff's translation of the Bible, where it appears several times for a "look-out place." We are all familiar with the word in connexion with "touters" on the look-out for jobs,—"*touting*" for employment. "Leading Post-street" speaks of the day when a hand-post was needed to direct persons to the "Merchant's-row," where in early days the traders exposed for sale the goods brought by sea, and carried up from the shore by the stairs. In the last century, Merchant's-row and Palace Hill were the places most resorted to by visitors.

The part of Scarborough which preserves the most of its old character is the triangular bit, beyond East Sandgate, at the extremes end of the south shore, facing the harbour, immediately under the Castle Dykes. There we have a tangled labyrinth of narrow alleys and yards, no wider than the Yarmouth "Rows," and equally unsavoury, into some of which it seems as if a ray of sunshine or a breath of pure air could never make its way. The main passage through this unattractive quarter is Quay-street, which contains several picturesque houses, some of which have extended themselves over the roadway, leaving only a passage beneath. One tall, gabled house on the fore-shore, next to the "Buoy Inn," is known as Richard III.'s house, that Monarch, according to an impossible tradition, having made it his abode when visiting Scarborough. The front towards the Quay till lately had a three-storied oriel window, and the ceilings of the principal rooms were curiously

decorated in plaster work. But it has been sadly pulled about, a new stuccoed front has been tacked on, and it has lost nearly all traces of antiquity. In spite of the definiteness of the inscription on its front, "Late Residence of Richard III., May 22nd, 1484," it is certainly not older than the middle of the sixteenth century. We know from the records that when Richard and his Queen visited Scarborough in 1484, they were housed in the Castle. In Quay-street itself are several old houses worth attention. At the corner of Parkin's-lane, which contains a number of quaint old houses, a half-timbered house, with projecting stories, deserves notice. Further along Quay-street the "Mariners' Inn" has a long, low, red brick front, with nicely-worked moulded brick pediments over the windows. Porritt's-lane and the yards that open out of it are worth penetrating for the sake of the tumble-down, airless, unless tenements which line them, the basements of solid masonry and projecting stonework chimneys indicating considerable antiquity. At the west corner of East Sandgate, a massive spur, rudely carved with a human head bearing a grotesque likeness to Sir William Harcourt, supports a projecting upper story. Adjoining this is the "Newcastle Packet" Inn, unhappily fronted, but showing in its flank, up a narrow entry lined with tall houses, a good specimen of rude half-timbered construction, supported on stone corbels. Behind the houses on the foreshore runs a long, narrow, dark alley, known as "The Bolts," a corruption of "les Boutes,"—"the vaults,"—the public latrines having stood here, when the rising and falling tides did the office of scavenger.

The fall from the ground above to the shore is so rapid that access to the upper town is obtained by long flights of break-neck steps, with terraces of houses at different levels on either side. Each flight has its distinctive name, such as New Steps, King's Steps, Bake-House Steps, Custom-House Steps, and Long Greece Steps. This last name, with its reduplication of a synonym,—"*greece*," or, as Shakespeare writes it, "*grise*," meaning a stair or step (*gradus, grès*),—has its counterpart in the "Grecian Stairs" at Lincoln, and the "Greece Steps" formerly existing by the Ouse Bridge at York. Westminster Abbey and Windsor and Grasmere Lakes present similar examples of the addition of an intelligible synonym when the original word had dropped out of the vernacular. In Quay-street, for many years the living heart of Scarborough, stood the Old Town-hall, the centre of the municipal, and we may add the Parliamentary, life of Scarborough, for before the Reform Act the Corporation alone returned the members. It was a mean building of a single story running down to the quay, which in 1874 was converted into a Wesleyan Mission Chapel; on the foreshore, also, close to West Sandgate, stood the Old Assembly Room, or, as it was popularly called, "The Long Room," now converted into Ellis's Grocery and Ship-Chandler's Stores. The arched openings of the sea front still remain. Before the erection of the present sea wall and the recovery of the foreshore, now a busy thoroughfare, the tide washed the front of this building, and old men tell of having angled for fish from the doorsteps. In the last century, the tide of fashion having mounted, a new "Long Room," as we have mentioned, was built on St. Nicholas Cliff, on the site of the present Royal Hotel, to be supplanted in its turn by the Spa and the hotel hall-rooms. Within a few yards of the Old Long Room stands the Custom House, with a tall, narrow gabled front of red brick, with rusticated quoins, a very characteristic specimen of prim Georgian architecture, formerly opening directly on the harbour. The "Bee Hive" Inn, next door, squeezed in between two tall neighbours, has a quaint old-world look. A small brick archway below formerly communicated directly with the sea.

The only passage for wheeled vehicles to the shore from the upper town was in early times by the steep and dangerous descents of East and West Sandgate. The latter was widened and improved on the formation of Eastborough, and is now easily practicable. Before this great improvement was carried out, the chief way down to the shore was by Bland's Cliff, formed in 1722 by a Quaker of that name, at his own cost. The name of another local benefactor of the same kind is preserved in Falconer's-road, a carriage road leading, by an easy winding descent from the top of St. Nicholas Cliff and Huntriss-row, to the sands near the Spa. This road was planned and executed by a certain Dr. Falconer, a clergyman of Lichfield, who had been "greatly impressed by the dangerous character of the old road," which ran in front of what were then called the New Buildings, on the west side of St. Nicholas Cliff, which had previously been the only road to the shore from that part of the town. These "New Buildings," a row of excellent lodging-houses, with an unbroken sea view, until the erection of the huge Grand Hotel blocked it out, were the first attempt to provide visitors to Scarborough with suitable accommodation. Another locality preserving the name of its builder is "Huntriss-row," now one of the chief thoroughfares of Scarborough, and much too narrow for the traffic. This street was originally called "Harding's Walk," from its first planner, about 1775, but changed its name when Mr. Jonathan Huntriss, a noted builder of the day, began a row of superior residences,—as they were then deemed,—on the east side. Huntriss's buildings were placed back from the street, securing a good width for the thoroughfare. It is much to be regretted that this line has not been maintained, and that the erection of shops has been allowed in front of these houses, and new houses built on the same line of frontage. A new thoroughfare, of sufficient width, from Newborough to St. Nicholas Cliff is a crying want at Scarborough, the narrowness and sharp turnings of the present circuitous route being very dangerous in the crowded season. The right course would evidently be to widen Bar-street by taking down one side. This would afford a direct communication to St. Nicholas Cliff and the Grand Hotel and the Spa. The old Burgwall Gate, now Cook's-row, leading by a gentle curve from the east end of St. Sepulchre-street to Long Westgate, commemorates by its change of name a local worthy, Mr. Tristram Cook, by whose instrumentality the dangerously steep ascent was thus obviated. Some of the decorous red brick houses bear on their fronts the initials W. H. E., with the dates 1703 and 1724. At the upper end Spreight's-lane leads by a long flight of stairs to St. Mary's Church. The first flagged "sidewalks," as our American cousins call them, were laid out in St. Nicholas-street, in connexion with the new "Long Room," in 1733, to form a promenade for the visitors, for whose protection a row of strong posts was also set up. This first beginning of foot pavements was followed by their general introduction in the leading thoroughfares in 1775. In 1805 the first Act for paving, lighting, and scavenging the town was procured. In 1810 oil street-lamps began to be provided, the cost being borne by voluntary contributions.

The markets, now combined in and about the Market Hall, opened in 1853, above St. Helen's-square, Newborough, were in medieval times held in different places. The first place of the market, as we have already seen, was in the Toller-gate district, to the west of the parish church. In the time of Edward VI. it was kept on the sands below the Castle. Later on they were collected about St. Helen's-square; the great Saturday market was held in Blackfriars Gate (Queen-street), at the south end of which the Cloth Market had its place, the Meat Market at the old shambles in St. Helen's-square, the Pig Market in St. Thomas's-street, while the buyers and sellers of corn assembled in the open thoroughfare at the top of Helperly-lane

(King-street). The Market Cross, re-built in 1620, stood in St. Helen's-square. Old views show it to have been more of a market-house than a cross, supported on Tuscan pillars, with a room above which was used as a guard-house. It was taken down in 1802. The Corn Cross is mentioned in 1631 as standing at the foot of St. Thomas's Gate. The Rede Cross was at the junction of Cook's-row and West Gate. The only cross remaining, and that in a mutilated state, is the Butter Cross at the head of West Sandgate, where its junction with Nether Westgate, St. Sepulchre-street, and St. Mary-street forms a little sort of irregular square. It is in the form of a tall square shaft, with a panelled stem ending in a crocketed pinnacle. It is not so long since that proclamations used to be made there. Here was the Lower Conduit; the Upper Conduit stood in Newborough, at the east corner of St. Thomas's-street; the Middle Conduit at the west corner of St. Sepulchre-street. The water supply of these conduits was brought from springs a mile distant. The leaden pipes which conveyed it having been pulled up by the Parliamentary soldiers when the town was taken by storm and pillaged, after the siege of 1645, the inhabitants had no proper supply of water for a long time. As late as 1728 we find them resorting to the Mill Beck and Peaseholme Brook, and other running streams, for their daily consumption. Another source was "Slutwell," near Sandgate, which seems to have only too well deserved its name. Hutton says, in his "Tour to Scarborough," "The best and worst water is to be had at Scarborough, the first from two excellent springs that bear the name of Spaw; the other from two dirty wells in the street from which is drawn a scanty supply with a string and a bucket." So precarious was the supply, and so insufficient the quantity, that some soldiers of the 29th Regiment having placed, for their own convenience, two casks on the castle dyking below the cliff, to receive tricklings of a spring, we are told "the contrivance" was hailed as a public benefit and "remained useful many years." Repeated attempts were made from 1804 onwards to bring an adequate supply to the public conduits, but with so little effect that even in 1826 we read of empty buckets being placed at the conduits, numbered with chalk to be filled in succession, and to be taken away six or eight hours after. A full report of the admirable system of water works by which since 1845 this great evil has been remedied, and Scarborough furnished with a plentiful supply of excellent water, is given in Mr. Millhouse's paper, published in the *Builder* for July 16 last, p. 53.

Scarborough, in common with all mediæval towns, was well provided with religious houses and churches. The Cistercians had a cell attached to the mother house of Cîteaux, on the hill near the Castle, to which the parish church of St. Mary's was appropriated by Richard I. On the dissolution of the alien Priors by Henry IV. the Priory was granted to the Augustinian Priory of Bridlington, and finally seized by Henry VIII. when that Priory was attained for the part taken by its Abbot in the Pilgrimage of Grace. The Dominicans or Black Friars had a convent between the modern Queen-street, formerly Black Friars Gate, and Aurborough Gate, the memory of which is kept up by the name "Friar's Entry" connecting the two streets. The house of the Carmelites or White Friars was adjacent, to the south, bounded by Newborough. Further to the east, bounded on the west by Duple-street, and on the south by St. Sepulchre's-street, was the convent of the Franciscan or Grey Friars. The site was till recently popularly known as "the Priary," and some small fragments of the walls remained, which have been nearly all swept away by modern improvements. The Friends' Meeting House and another large chapel occupy a portion of the site. There were also two hospitals or almshouses, dedicated respectively to St. Thomas of Canterhury, and St.

Nicholas, each with its chapel and its band of brothers and sisters.

The whole of Scarborough formed one parish, St. Mary's, but there were several other churches and chapels, some of them with quasi-parochial rights. For the supply of the spiritual wants of the western part of the town, from which St. Mary's was inconveniently distant, a large chapel was erected on the north side of Newborough, just within the bar, in connexion with the hospital of St. Thomas of Canterbury, and bearing its name. This church, described by Leland as "a great chapelle by side of the Newborowe Gate," during the siege of 1645 was converted into a magazine by the Parliamentary Commander, Sir John Meldrum, and was consequently made a mark for the Royalists' guns, by which it was reduced to ruins. "Part having fallen and the rest being ready to fall," the shattered walls were taken down by order of the bailiffs in 1649, and the materials were employed in the repair of St. Mary's. Its name survives in St. Thomas's-street. There is a modern red brick church of St. Thomas—not of Canterbury—near the quay, built in 1840. The memory of the church of St. Nicholas is preserved by St. Nicholas-street and St. Nicholas Cliff, on the edge of which, near the entrance to the Cliff Bridge, it stood. Its site has been destroyed by the wasting away of the cliff. The church of St. Sepulchre, which gives its name to St. Sepulchre's-street, seems originally to have belonged to the Knights of St. John of Jerusalem, and to have been made over by them to the Franciscans, whose church it became. It was dedicated in 1306, and subsequently assumed a parochial character. Before Leland's visit in 1534 it had fallen into decay, and was taken down in 1564. Of the church of St. Helen nothing is known beyond the name, which survives in St. Helen's-square, the site of the old market cross.

There are plenty of new churches and chapels in Scarborough, good, bad, and indifferent, and in all styles. Mr. Bodley's St. Martin's, though by no means faultless, is the best. The contrast between that and Christ Church, consecrated in 1828 (an example of what was then considered correct "Early English" adapted to modern requirements) is a refreshing proof of the advance of ecclesiastical architecture in the last half-century. The only mediæval church remaining is St. Mary's, the old Parish Church. It is but a fragment of the original building, having lost its chancel, of which only a few shattered walls remain, its north transept, and the upper stories of its north-western towers. The central tower, rebuilt in 1659, though evidently constructed of old materials and retaining something of its former outline, is but a poor substitute for that which preceded it, which, according to Leland, as well as the western towers, was surmounted by a "pyramis" or spire. Like St. Thomas', during the siege of 1645 this church was occupied as a stronghold by the Parliamentary forces, and was bombarded by the ordinance from the castle, still in the hands of the Royalists. The chancel,—a Perpendicular building of magnificent dimensions, measuring 115 ft. by 53 ft., with lofty aisles of the same length and height as the central aisle,—was reduced to ruins, and the tower so much shaken that it fell down in 1649, crushing in its fall the north transept and the wide additional north aisle, "the Fishermen's aisle," built for the worship of the class whose name it bears, or St. Nicholae's aisle. The north transept was never rebuilt, and the first reconstruction of the aisle was of the meanest character. The church, as it now stands, consists of a nave and side aisles of five bays, the very wide second north aisle (St. Nicholas' aisle, already referred to), a south transept ("Farrar's aisle" was its old name), the lantern space, which does duty for a chancel until a more worthy one is erected, and a series of four chantry chapels, annexed to the south aisle. The nave and aisles are Early English, of early date and very good

character. The northern arcade has huge cylindrical piers throughout. On the south side two similar piers at the east end are succeeded by one with eight slender shafts set round a central core, combined under a continuous table ahacus; the next pier is an octagon of Decorated date, probably inserted when the adjacent chapels were built. The last pier is the earliest of the series, consisting of four fluted cylinders, with Transitional capitals, and a moulded abacus over all. The arches opening into the western towers are earlier still; they are pointed, with clustered responds mostly, and with the square ahacus. The architectural history of the south side of the nave presents a problem not very easy to solve. The mixture of dates is confusing. The sudden thinning of the wall in the middle of the third bay, and the distortion of the arch at this point, and the introduction of a single Decorated pier, point to some work of reconstruction in the fourteenth century, which did not, however, affect the clearstory. This, as already suggested, may have been connected with the erection of the side chapels. The clearstory is uniform throughout. There is an Early English shafted lancet in each bay, and a horizontal string-course below. The wall-shafts between the clearstory windows show variations of treatment. Some come down to the spandrels of the arcade, others stop short at the clearstory string; two at the west end of the north side are fluted, the others circular. The roof of the north aisle having been raised, the clearstory on that side gives no light, the windows opening, triforium-fashion, into the aisle. The weather moulding of the old aisle roof appears on the east face of the north tower. The wide additional fishermen's aisle is separated from the original north aisle by an arcade of four Decorated arches on tall octagonal piers, with capitals of foliage. The whole of the walls and windows of this aisle belong to the 1850 restoration. The most characteristic feature of the church is the row of four chapels, gabling southwards, like those at St. Giles, Oxford, annexed to the south aisle. The external roofs of these chapels are of slabs of stone, with a ridge-cresting. Within they have pointed harel vaults with transverse ribs. Both from without and within the effect is singularly picturesque. At the east end of the south aisle is a respond, of Transition date, of the arch opening into the transept of a smaller and earlier church, of which there are also some traces at the end of the north aisle.

The church, which, like most town churches, had been be-pewed and be-galleried out of all ritual and architectural propriety, underwent a thorough restoration from Mr. Christian in 1848-1850, which may be pronounced very creditable, especially for the date. The crossing beneath the tower, which had been used as the coal-hole, was fitted up as the sanctuary, and a new east window was inserted. A choir has been recently formed in the eastern bay of the nave from the designs of Mr. C. Hodgson Fowler, of Durham. Other works by the same gentleman are in progress. We should be glad to know that a new chancel was included in them. This is the great need of this fine and interesting church, without which it must remain deplorably incomplete. The restoration of the former enormous chancel would be unwise, even if the great outlay it would require did not forbid it. Suitable for a double church, such as Scarborough was in Cistercian days, when the choir received the monastic body, and the nave the parishioners, so large an eastern limb would be out of harmony with present requirements, and be practically unusable for parochial purposes. But a chancel of some sort, instead of the present makeshift sanctuary, is essential.

PROPOSED RESTORATION OF LEANING CHURCH.
—The *North Wales Chronicle* says that it is proposed to restore this ancient parish church, and it is estimated that 1,450*l.* will be required for the purpose.

THE SARCOPHAGI FROM SIDON.*

So long ago as 1887 reports reached England—reports so startling that many were inclined to set them down as apocryphal—the discovery at Sidon of a series of sarcophagi, decorated with sculptures of extraordinary beauty, which were to rival the Parthenon marbles in public estimation. In 1888 we visited Constantinople, whither the marbles had been transported, in the hope that a special letter of introduction might secure us a "private view." The director, Hamdy Bey, was absent on business, and the reward of our journey was—full permission for the careful study of the outside of the packing-cases in which the sarcophagi were securely concealed. Their publication was necessarily a lengthy labour. The first *livraison* of the sumptuous work of their reproduction now lies before us—and it is amply sufficient to assure us that for once rumour did not exaggerate the importance of the discovery.

Like so many other important "finds," the Sidon sarcophagi are the result, not of a patient, premeditated system of excavation, but of a happy chance. Early in 1887, Mehmed Cherif Effendi, who owned the territory of Aya, in the neighbourhood of Saïda (the ancient Sidon), in the course of certain works on his own estate which he had undertaken in order to get building stone, came upon an ancient shaft, at the bottom of which, it seemed to him, there might be a tomb or tombs. At Saïda the inhabitants are so constantly, it seems, engaged in small private excavations in their own gardens, that everyone knows the possible importance of such a shaft. Conscientiously conforming to the local law about antiquities, Mehmed Cherif immediately sent word to the Caimakam of Saïda, and this official came next day to test the truth of the conjecture. On the east side of the shaft he soon discovered a hole, through which he looked, and at once perceived a hollow chamber containing two sarcophagi, of which one was decorated with sculptures. He, in his turn, at once communicated the discovery to the Governor-General of Syria, Nachid Pacha. Orders soon arrived for the clearing out of the shaft, and very shortly the entrance to two other chambers,—north and south,—was made out, and these chambers also were found to contain sarcophagi. On March 15 an engineer, Bachara Effendi, was dispatched to Saïda, and succeeded in laying bare, one after the other, seven chambers, all containing sarcophagi.

A provisional report, necessarily superficial and in part inaccurate, was dispatched at this point to the Minister of Public Instruction at Constantinople, and on the basis of this report it was decided that to Hamdy Bey should be entrusted the work of pushing on the excavations and transporting the precious sarcophagi to Constantinople. These monuments are already associated in the popular mind with Hamdy Bey, but it will be seen that he was in no way the discoverer. To this he is the first himself to draw attention in his preface, and he makes full acknowledgment of the tact and care with which the work of excavation previous to his arrival had been conducted.

Hamdy Bey left Constantinople April 18, 1887. At Smyrna he was joined by a second archaeologist, Demosthenes Balthazi Bey, and on June 29 the work of extracting the sarcophagi and getting them aboard began.

The Sultan, gratified at the success of this first expedition, gave to the proprietor, by way of compensation, 1,500 livres (Turkish), decided to send Hamdy Bey for a second term of exploration, and further announced his intention of erecting a special building to receive the sarcophagi. This building, the work of M. Valauren, architect and professor in the *École des Beaux-Arts*, was begun at once and is now complete—the sarcophagi

are safely enshrined there. The work of restoration, a task of extreme delicacy, was entrusted to Ifsan Effendi. Hundreds of fragments had been broken off, and these, before the sarcophagi were lifted out of their chambers, were collected with great care.

Such is the history of the finding of the sarcophagi. The work of publication is divided in the book before us between Hamdy Bey himself and Theodore Reinach. Hamdy Bey gives the complete narrative of the excavations; Reinach reserves to himself all archaeological commentary on the sculptures.

For all details of the excavations we must refer our readers to the book itself. They would be unintelligible without the excellent plans that accompany them. M. Reinach's commentary is held over to the second volume, which is to appear next year, and will be eagerly looked for. Meanwhile the plates that appear in this first issue give us,—1, a plan of Saïda (Sidon) and its environs; 2 and 3, a plan of the Necropolis of Aya, with sections, &c., of the various tombs; 4, 5, 7, 8, 11 (note the irregular numbers) are devoted to the exquisite sarcophagos of the mourners. Reports of the beauty of this monument have already become current, and unquestionably the figures of the mourning women remind us strongly of the best specimens of Attic sepulchral art.

Then follows the "Lycian Sarcophagos," the sculptures of which (plates 12, 13, 14, 15, 16) are even more striking and remarkable. The ends of this sarcophagos are decorated in very low relief, with beautiful designs of griffins, sphinxes, and heraldic Centaur groups. The sides are occupied with groups in the highest possible relief, and of marvellous beauty, which represent quadrigas and horsemen. The horsemen figures recall both the cavalry of the Parthenon frieze and types, such as the monument of Dexileos. The third sarcophagos published is that "of the Satrap;" the sculptures are of far less merit and interest. We reserve all discussion of style and interpretation till the appearance of M. Reinach's commentary. The work, when complete, will consist of four issues, with 250 pages of text, fifty plates in heliogravure, and from eight to ten in chromolithography.

NOTES.

THE Report to the Court of Common Council from its Local Government and Taxation Committee on "Electric Railway Bills in Parliament" suggests a good deal of question as to the advantage, on some points even as to the feasibility, of this proposed system of subterranean burrows for relieving street passenger traffic in London. It is a condition that the tubes are to be laid in the London clay, not in the upper stratum; which means a considerable depth to descend to. A certain amount of space must be robbed from the now overcrowded streets for entrances to the tunnels, and there is no doubt, as the report admits, that "serious interference with the traffic of the streets must be faced" during the making of the railways, and that the construction of the subway and central station opposite the Mansion House would necessitate the whole of the immense traffic at that point being carried on timber platforms for at least eighteen months. And after all this, what is the ultimate probability that this system of subterranean tubes, only to be reached and quitted by a deep vertical lift, and which must be dependent for their safety upon an elaborate system of mechanical ventilation,* will be a useful or a popular mode of locomotion? Nor have we yet got electrical mechanics so thoroughly in hand as to feel insured against an occasional breakdown, and the position of passengers in a train left standing for an indefinite time in the middle of an underground tube would not be an enviable one. The short line from the Mansion House to Liverpool-street would be the most likely to be used and useful; we may doubt whether a

* About the question of ventilation no word is said in the report.

* O. Hamdy Bey et Th. Reinach. *Les Sarcophages Royaux de Sidon*. *Éditions de Hamdy Bey*. Paris: Leroux, 1892. *Livraison I. Texte et Planches*. Paris: Leroux, 1892.

the railway 11 ft. 6 in. diameter from Waterloo tube to the Mansion House, and passing under the bed of the Thames, would be a very favourite route, and whether the existing open-air line from Waterloo Junction to Cannon-street would not be preferred by most passengers. Then the report draws attention, and not without reason, to the importance of constructing all local railways of the same gauge as the railway system of the country, so as to admit of any extension by junctions afterwards if found desirable. This is a point of the greatest importance, but *per contra* it is urged that the adoption of tunnels large enough for the regular gauge would in most cases be out of the question on economical grounds. We have no wish to discourage new enterprise in means of locomotion, but it is impossible not to see that there are very serious drawbacks to this proposed system of small-bore tunnels deep under London, and that both their practical and financial success is still matter for debate.

THE new Ministers are now settling down to their administrative duties, free at present from Parliamentary criticism. With two or three appointments only we have any particular concern. The first of these is that of President of the Local Government Board, which every year becomes a more important administrative office. There can be little doubt that Mr. Henry Fowler will be an efficient Minister; he is hardworking and businesslike, and whatever may be the purely political acts of the new ministry, we feel no doubt that Mr. Fowler will carry on well the excellent work done by his predecessor, Mr. Ritchie. A firm hand is needed in this post, or the President of the Local Government Board has practically to keep local bodies up to their work, and as Secretary to the Treasury in Mr. Gladstone's last administration, Mr. Fowler showed both tact and firmness. Sir Walter Foster, who serves under him, in Mr. W. H. Long's place, as a medical man should bring useful qualities to his office, but we trust that he will not be too much of a theorist and too little of a man of business. Still, both these appointments are, simply as appointments, satisfactory; in a year's time we shall be able to see how far this promise is fulfilled. The fact that Mr. Shaw-Lefevre again fills the post of First Commissioner of Works is not a subject of congratulation. Mr. Shaw-Lefevre is a typical official, with a good deal of the obstinacy of the permanent public servant, but without the general capacity which usually distinguishes a permanent head of a department. He has absolutely no special qualification for this post. The fact is that this post should cease to be a political one, and in place of the First Commissioner, who goes in and out with each change of Government, and of the Secretary, who is the permanent and non-Parliamentary head of the department, there should be (as we have again and again urged) two Commissioners who should hold their appointment permanently, and who should be chosen to fill these places on account of special qualifications for the position. It is preposterous that this office should be one held by a Cabinet Minister; two permanent and well-qualified heads could carry on the work much better, and the President of the Local Government Board, or the Home Secretary, could be the Parliamentary spokesman. The misfortune of having Mr. Shaw-Lefevre at the Office of Works is that, with all his incapacity, he is a man who will not keep quiet, and who consequently is never content unless he is spoiling something.

THE last number of the *Lancet* contains a statement of the results of a systematic inquiry made by that journal into the present condition of the sanitation of dwelling-houses, in the shape of an analysis of the answers sent by a number of house-agents and others interested in house property to the following schedule of questions:—

"I. Whether the information usually supplied by clients to house-agents respecting the sanitary

history and condition of the property they are asked to let is sufficient.

II. (a) The sort of information usually supplied; (b) the kind of information which could and should be furnished.

III. Whether the house-agent was prepared to make or obtain an efficient survey of a house and its sanitary arrangements.

IV. Whether Section 12 of the Housing of the Working Classes Act, which renders it necessary that tenements to be let shall be reasonably fit for human habitation, should be extended to all houses without distinction.

V. Whether the opinions expressed on the above would apply to houses and lodgings let for short periods at seaside places and health resorts.

VI. Whether there is anything not covered by the foregoing suggestions which should be considered."

It is not surprising to learn that the answers to questions I. and II. went to show that the information supplied to house-agents as to the sanitary condition of a house is usually very meagre and very vague; a fact, however, which does not in general deter house-agents from giving the most positive and satisfactory assurances of the sanitary condition of the house they are commissioned to let, though in general avoiding any statements in detail. The house-agent, in fact, acts in the interests of the landlord and as his representative. Hence it is not surprising to find that a good many agents, while admitting (in answer to question III.) that a survey of the sanitary arrangements ought to be made in the interest of the tenant before letting a house, consider that the agent is not the person to do it, nor the person whose statement would be likely to be accepted by a cautious tenant. The question remains whether the tenant should employ his own architect to report on the sanitary condition of the house, or whether he should have official inspection placed at his disposal on application to the sanitary authority. The latter course has been much discussed of late. There is a good deal to be said for it, perhaps, in the interests of public health, but it would throw a heavy expense on the community, and rather savours of grandmotherly legislation. The *Lancet* report gives prominence and praise to the Eastbourne system, whereby certificates are granted to landlords on the proof (furnished voluntarily, not on compulsion) that their houses are up to a specified sanitary standard. This, however, is a system more suited to watering-places and other lodging-house depôts than to the permanent residential property of a large city. In the general recommendations offered we are surprised to find the *Lancet* contenting itself with specifying "two to four gallons" as the amount of water for a water-closet flush. Three gallons is the least that should be permitted, and that is too little in most cases, especially in large towns with a complicated drainage system in which quick and efficient water-carriage to the sewer is as important as flushing out of the basin. The remarks as to ventilating the drains also assume an action on the part of so-called "inlet" and "outlet" ventilators which often does not really take place. We have often observed that medical men have a much clearer idea of the ends to be aimed at in a drainage system than of the mechanical conditions of its working.

AS our attention has been turned to earthquakes during the last few days, it may be opportune to mention some photographs which we have received from Mr. Mayne, of Shanghai, showing some of the effects of the last great earthquake in Japan, by way of consoling some of those who have been alarmed at the accounts of the recent earthquake in South Wales. The study of these records of the Japanese earthquake may at least tend to make dwellers in Great Britain more contented with the milder visitations to which they are exposed. Among the photographs from Japan is one showing the wreck of the iron railway bridge at Nagara river, the middle girder prone on the earth and the other two sloping down to it from the level of the piers; another shows a village where the ground sank 18 ft. over an area of half a

mile; the Spinning Thread Company's building at Atsuta is shown as a heap of ruins; a temple at Kimbara (native architecture) shows an even more thorough collapse, as also the native timber bridge at Nagoza, with the two shore ends fallen into the water. The most formidable example is the one labelled "condition of Nifu province," which represents a large extent of wrecked buildings tumbled into shapeless ruin. After this, one is almost ashamed to complain of the shocks which caused so much excitement and alarm last week in South Wales.

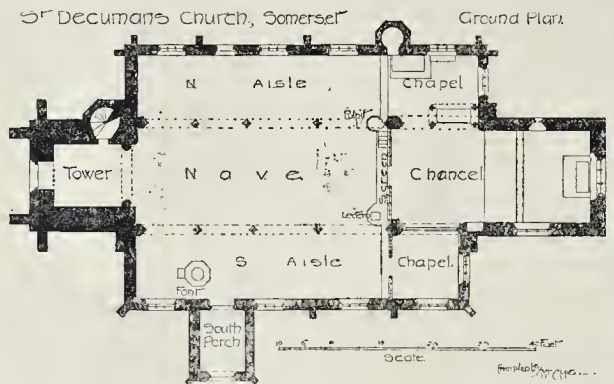
AMONG the numerous letters with which the *Times* is filled when Parliament is not sitting, one signed "Indicus," appearing on the 19th, referred to the supposed inadequate maintenance of our railways, the writer asserting that many of our railway structures were allowed to lapse into an unsafe state from an improper economy on the part of the railway companies, and urging that further powers should be conferred on the Board of Trade to enable them to inspect the condition of roads and viaducts and insist on their proper and sufficient maintenance. We quite concur in the criticism made by another correspondent, that the writer should have made public his name and his capacity to speak on the subject; we may add that he gave no facts, and only made a general allegation, and we have no doubt that his letter was calculated to convey to the minds of readers ignorant of railway work a grossly exaggerated impression as to the existence and extent of the evil complained of. We should imagine that the cases in which a Board of railway directors in this country disregarded the recommendation of their engineer about repairs, through motives of economy, were very rare indeed. At the same time, we believe that the powers desired by "Indicus" ought to be given to the Board of Trade. We may recall one case, which some of our readers may remember, when a broad-gauge Great Western express ran off the rails, and the Board of Trade Inspector stated in his report that he had some time before warned the Company that their road was not in a condition for such high speeds, and it appeared that the warning had been disregarded, no doubt from motives of economy in the case of a railway which was then in a by no means prosperous condition. Such a circumstance would have been out of the question on such lines as the London and North-Western, the Midland, or the Great Northern, or perhaps on the Great Western under present circumstances and management (though we suspect that line is far from what it should be in its more western portions); but the fact that such a warning was in that case given and disregarded, and that an accident was the consequence, shows that the recommendation of "Indicus" was not entirely uncalled for. It certainly seems absurd that the Board of Trade should be in the position of pointing out defects in the state of the road or bridges, and yet have no power to enforce the carrying out of the repairs requisite for safety.

ANOTHER *Times* correspondent, Mr. G. B. Richardson, on Saturday last occupied more than a column of that paper in elaborately reissuing the suggestion that the difficulty of the London water supply should be got over by furnishing London with a double supply, the chalk water for drinking and cookery, and an inferior and less pure water for other purposes. It may be as well to observe that this idea has been discussed and dismissed long ago. The complication and expense of double water supply to every house in London has long been seen to be out of the question.

AT a recent meeting of the Académie des Inscriptions at Paris several papers of general interest were read. M. Cham-

poiseau gave an account of the sanctuary of Apollo, laid bare at Actium by the recent French excavations. It was found that temples of very various dates had been superimposed. The latest of these structures was of Roman work (that known as *opus reticulatum*), and, apparently, was the very sanctuary that Octavian, according to the account of Suetonius, ordered to be erected immediately after his victory over Antony. M. Reinach read a paper on Celtic tin in ancient times—the Kassiterides. These, it is universally acknowledged, and M. Reinach agrees to it, were the British Isles. He noted that the ancients were fond of calling metals after the places where they were found,—e.g., copper from Cyprus, bronze from Brundisium, tin *Kassiteros* from the Kassiterides. The word is Celtic, and means, according to M. Reinach, “far away,” it often occurs in Gallic names—e.g., Cassivellaunos. As the word for tin occurs in Homer, M. Reinach concludes that Britain had a Celtic population in the eighth and ninth centuries B.C. M. Geoffroy stated that the Selinus excavations (to which attention is drawn in our present issue) have further yielded a frieze of painted terra-cotta belonging to the temple from which came the now famous metopes.

LAST week Dr. Tristram, Q.C., granted faculties relating to various churches within the diocese of London. One,—being somewhat novel in its kind,—is for the making an open-air pulpit in one of the two windows at the west end of Trinity Church, Marylebone, as a memorial to the late Prebendary Cadman. An external pulpit forms one of the features of the new Whitechapel Church, where the open-air services have proved, it is said, highly successful. Trinity Church was designed by Soane, we believe; a chancel was added in 1878 by Mr. G. Somers Clarke. The faculty extends to the construction of a baptistery at the south-eastern corner, an enlargement of the vestry, and an improved system of lighting and heating,—for a total cost of 2,400*l.*, of which a considerable portion is subscribed. At All Hallows Barking, Great Tower-street, it is intended to expend an estimated sum of 8,000*l.* in building a new side-chapel, and otherwise improving and altering the church; and, under the faculty, in converting the churchyard into a garden and recreation-ground. Some of the greatly-crowded remains will be removed to Ilford Cemetery. New heating apparatus, involving an examination of the vaults, is to be supplied for St. Giles’s, Cripplegate, and some old tombs, now used as flooring, are to be taken up. In the event of interference with human remains, the Court stipulates that they shall be dealt with under its directions. This church has undergone many changes of late years. In 1858 the side galleries and plaster ceilings were taken down; further works were done (externally) in 1885, and under the superintendence of Mr. F. Hammond, architect, in 1888-9; last year some of the interior stone-work was renovated. Another faculty sanctions the building of a choir-vestry, with the alteration of certain graves at St. Mary’s, Finchley. That church, where Archbishop Bancroft had been rector, was restored thirty years ago by R. C. Billing, at a cost of 4,000*l.* It has an embattled tower, with other features common to the smaller parish churches of Middlesex. Of earlier open-air pulpits or crosses in London, we may here cite that in St. Mary Spital Priory churchyard (since Spital-square) without Bishopsgate, and that by St. Paul’s, which, together with the “shrowds,” is shown in Mr. H. W. Brewer’s view of old St. Paul’s Cathedral, published in the *Builder* of January 2 this year. The congregation sought shelter in the shrowds in inclement weather. We are informed that they discovered the foundations a few years ago on laying out the ground as a public garden. See also two illustrations in Mr. J. B. Marsh’s recently-published volume, “St. Paul’s Cross.”



A PROPOSAL is made to erect in St. Mary’s, Aldermanbury, a commemorative tablet to two parishioners, Henry Condell and John Hemminge, to whom we are indebted for the first collection of Shakspeare’s plays, which they published in the folio of 1623, with a dedication to the brothers William, Earl of Pembroke, and Philip, Earl of Montgomery, and an address “to the great variety of readers.” They were fellow-players; the latter, *teste* Malone, was born circa 1556 at Shottery, and, albeit a tragedian, the original impersonator of Falstaff, and each was left by Shakspeare’s will a sum of 26*s.* 8*d.* to buy a mourning ring. Hemminge was at one time principal proprietor of the Globe Theatre, in which, as well as in the house at Blackfriars, Condell also owned a share. They both resided for many years within the parish, and were buried in the church, Hemminge on October 12, 1630, Condell (who died at Fulham) on December 29, 1627. Condell’s estate comprised his shares in the two theatres, some land and tenements in the parishes of St. Bride and St. Mary-le-Strand, in Helmet-court, and his houses in St. Mary, Aldermanbury, and Fulham. In the course of some repairs in this church, rebuilt by Wren at a cost of 5,237*l.*, they found by the communion-table the coffin, bearing his name, of Lord Chancellor Jeffreys, which had been removed from St. Peter’s-in-the-Tower three years after his death, and laid near to the remains of his only son, Lord Wem.

IT is a pity that the Editor of *Punch* does not acquire a little correct information as to who and what an architect is, and wherein he differs from a speculating builder. Some time since *Punch* indulged in an absurd scene between a builder and a District Surveyor, in which the latter was represented as compounding the structural iniquities of the former for a consideration of drinks and a small tip; the writer of the piece being evidently totally ignorant as to the class of persons from whom District Surveyors are appointed. This week we have some verses in imitation of “The Walrus and the Carpenter” in which “The Builder and the Architect” are represented as combining to invite tenants to take villas built of “mortar made of mud from roads,” with unventilated drains, &c. If *Punch* knew anything about the matter, he would know that the builder who builds houses of that kind is “his own architect,” and that an architect is the very last person he would wish to have anything to do with.

THE NEW DRILL-HALL, ALTON, HANTS.—The foundation-stone of the new headquarters of the 1st Vol. Batt. Hampshire Regiment was laid by H.R.H. the Duke of Connaught, K.G., on the 11th inst. The building has been designed by the architect (Mr. J. Robinson, C.E.) so as to be in harmony with the County Hall and other adjacent County offices. The cost of the work will be about 2,000*l.*, which it is proposed to raise by subscription.

THE ARCHITECTURAL ASSOCIATION:
TWENTY-THIRD ANNUAL EXCURSION.*
Wednesday, August 17.

As the programme provided for a rather late start by train from Taunton, arrangements were made, by the kindness of Mr. Bidgood, the Curator, for the members to visit first the Museum of the Somersetshire Archaeological and Natural History Society, which is housed in the old Castle of Taunton, purchased by the Society as its headquarters in 1874. Part of the original Norman work, built by Bishop Giffard in the reign of Henry I., probably about the year 1130, still remains, but the greater part of the buildings existing is of later date,—part erected in the fourteenth century, part by Bishop Langton in 1490, and part by Bishop Horne in 1577. The Hall, in which Judge Jeffreys held the “Bloody Assize” in 1685, has suffered much in the extensive repairs and alterations made in 1785. Of the collections in the Museum, the most interesting to an architect are the Pigott drawings, six large volumes of sketches in Indian ink of old work in the County of Somerset, executed by J. Buckler and his son, J. G. Buckler, which are invaluable for the record they preserve of the architectural remains of Somerset existing at the beginning of the present century. There are also numerous examples of archaeological and architectural interest, the period covered by the collection extending from the Stone and Bronze Ages to the last century.

After their visit to the Museum, the members proceeded by train to Bridgwater, which was made the headquarters for the day.

Bridgwater derived its name from Walter de Douay, one of William’s followers, on whom it was bestowed at the time of the Conquest, and was thence called “Burgh Walter” and “Brugga Walter,” by which names, both signifying Walter’s burgh, or borough, it is designated in various ancient records. William de Briwere, to whom it was granted in the reign of Henry II., built a castle in the following reign, combining the strength of a fortress with the splendour of a baronial residence, and obtained from King John the grant of a market and a fair. He founded the Hospital of St. John, for a Master, brethren, and thirteen poor persons of the Order of St. Augustine, the revenue of which at the Dissolution was £120, 10*s.* 1*d.* He also constructed the haven, and began to erect a stone bridge of three arches over the river Parret, which was completed by Sir Thomas Trivet in the reign of Edward I. His son William founded a monastery for Grey Friars about 1230, and dedicated it to St. Francis. The barons, during their revolt against Henry III., took possession of the town in 1260. In the Parliamentary war the inhabitants embraced the Royal cause, and the castle was garrisoned by the King’s forces. In this castle, on account of its being strongly fortified and abundantly supplied with ammunition, the inhabitants of the surrounding district deposited their money, plate, and other articles of value, as in a place of security. The Parliamentarians, under Fairfax, soon afterwards invaded the town and laid close siege to

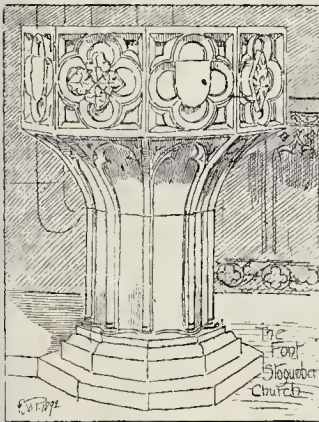
* Concluded from p. 147, ante.



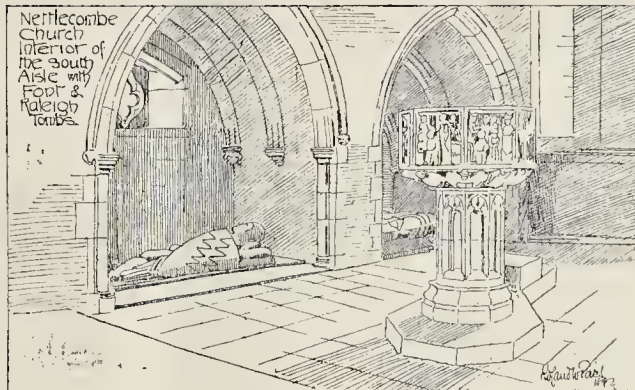
St. Decuman's Church.



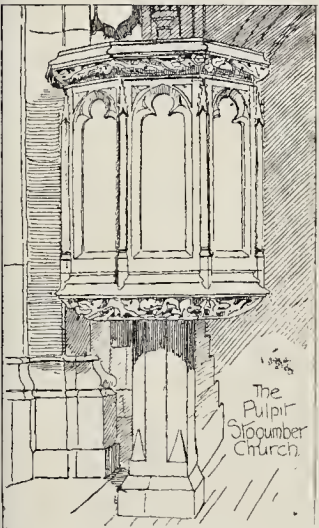
Nettlecombe Court.



The Font St. Decuman's Church.

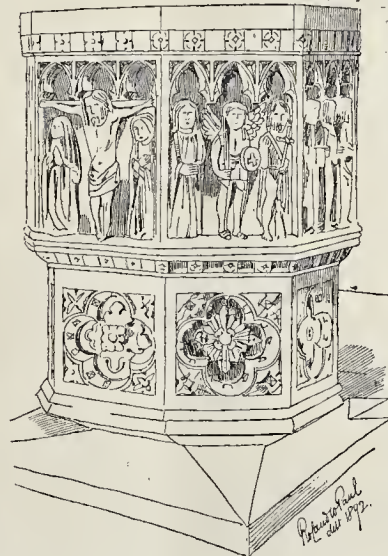


Nettlecombe Church Interior of the South Aisle with Font & Raleigh Tombs.



The Pulpit St. Decuman's Church.

Taunton - Font in St. James Church.



Taunton. A. Bp BREWER'S initials on Almshouses B. Bp FOX'S Crest etc. on E. wall of Grammar School



the castle, which was resolutely defended, but the town having been fired on both sides of the bridge, the garrison capitulated on terms of personal indemnity, and surrendered the fortress with all the treasure in it and 1,000 prisoners into the hands of the enemy. The castle, which had sustained considerable

damage during this siege, was demolished in 1645; the sally-port and some detached portions of the walls are all that now remain. In the reign of James II. the inhabitants favoured the pretensions of the Duke of Monmouth, who on his arrival from Taunton was received with great ceremony by the Corporation, and proclaimed King. He remained for some time in the town, and, having from the tower of the church reconnoitred the royal army encamped

on Sedgemoor, he rashly resolved to hazard the battle that terminated so fatally to his ambition. His adherents in the town suffered severely for their attachment to his cause under the legal severity of Jeffreys and the military executions of Kirke. The only building visited in Bridgwater was the church, the greater part of which is of about the date 1420, though some portions are earlier, showing that the building was rebuilt

at this period. The most striking feature of the church is the steeple, with its low square tower and lofty spire without spire-lights or other decorative features. Internally, the fine spacious effect of a large Perpendicular church is well seen, and the church is also rich in carved woodwork, in pulpit (alluded to in last week's *Builder*, p. 140), screens, and roofs. These latter are very fine examples, as are also the late seventeenth-century screens in the south transept forming the reserved space for the Mayor and Corporation.

From Bridgwater the first place visited was Cannington, where the Court-house, now used as a Roman Catholic industrial school for 100 boys, was the primary object. This, however, proved somewhat disappointing, as, though the courtyard is picturesque, there is little in the way of detail which can pass muster even with one's mind fully open to the beauties of late and debased work. Little remains of the Priory of Benedictine nuns, founded in 1138 by Robert de Courcy, beyond the old altar-slab, 10 ft. 7½ in. by 3 ft., now adapted as a chimney-mantel. The modern Corinthian chapel hardly awakes enthusiasm.

The church at Cannington is of some interest, from the arrangement of nave and aisles under one roof, as well as from the unusual proportion between the length and height of the church. There are some good screens and a few bench-ends worthy of note. The tower is lofty and of good design, and it need hardly be said that the whole church is of Perpendicular date.

Several of the members walked over to Gurney Street Farm, near Cannington, to which we alluded in last week's issue, for the sake of seeing the chapel, especially, but they were unable to do so, as the tenant had left a note to the effect that it was not convenient for the visitors to see inside the house.

After luncheon the party drove to Blackmore Farm, also near Cannington, which, as may be seen from the sketches in last week's *Builder*, p. 141, is a picturesque and interesting example of a small manor-house with chapel. There seems to have been a south wing originally, balancing the projection of the chapel, but this is now destroyed. The interior has been completely modernised, and denuded of nearly all interest, beyond what is contained in the plan. The chapel has, on each side of the east windows, some excellent canopied niches for figures.

From Blackmore Farm a pleasant drive brought the members to Spaxton, where the church is well worth study, the western tower with its turret at the east end of the north side, — a very frequent position, — being especially pleasing in its proportions. There are some very good well-carved bench-ends, bearing the dates of 1536 and 1561, and an ancient and curious alms chest. The detail of the caps to the nave arcade is peculiar, and worth noticing. In the churchyard is a well-designed cross, with sculptures of the Crucifixion and other figures, subjects under flat canopies on the four faces of the head of the cross. The manor-house, L-shaped on plan, is picturesque, but the interior has been much altered.

From Spaxton the party returned to Bridgwater station, and thence by rail to Taunton.

Thursday, August 18.

On Thursday the early train was again taken to Williton, whence the party drove to East Quantockshead, where the church and manor-house, a seat of the Luttrells, furnished, as may be gathered from the illustrations in last week's *Builder*, plenty of occupation for the two hours allotted. The manor-house is not only an excellent example of a sixteenth-century residence, but is rich in old furniture of various dates, while the plaster-work of friezes and ceilings, and the carved mantel-pieces, are exceptionally rich. The church, as we remarked last week, is small but rich in excellent carving, in bench-ends, screen, and pulpit (dated 1633), and picturesque both internally and externally.

The next place visited was Nettlecombe (see sketch), the seat of Sir Arthur Trevelyan, which contains many interesting curiosities and portraits of the house of Trevelyan. The visitors were shown the valuable old examples of communion plate, including chalice and paten of apparently fifteenth century date. The house has received many additions and alterations in the seventeenth and eighteenth centuries, some of the chimney pieces being dated 1641, while the staircase is apparently a century later, and is a good example of rococo work. The great hall is a fine room, with screen and organ

gallery over and an elaborate plaster ceiling. The church has a good western tower, nave and aisles, and north aisle to the chancel, and contain some early monuments to the Raleighs (see sketch). There are, of course, a number of well-carved bench-ends, and there are also some remains of fifteenth-century glass.

From Nettlecombe the party proceeded to Combe Sydenham, an interesting manor-house with an exceptionally picturesque tower, shown in the illustration in last week's *Builder*. Over the entrance porch is the inscription—

"Porta tuis semper Georgii generose pateho, Ingratis animis janua clausa patens."

We suppose the present owner assumed that the members of the Association might be counted amongst the "ingratis animis," as they were not allowed to see the interior, and, therefore, had to content themselves with the picturesque grouping of the exterior and the small amount of detail to be found in the entrance porch, which bears the date 1580.

This concluded the day's work, which, it will be seen, was rich in excellent domestic work. On this day occurred the second heavy shower encountered during an otherwise exceptional spell of fine weather.

Friday, August 19.

The first visit on this day was made to the beautiful Church of Kingston St. Mary (a view of which was given in last week's *Builder*). The splendid tower, which, as may be seen, is of the characteristic Taunton type, is now encased in scaffolding, and is being pointed down, the defective portions of stonework repaired, and cramps seen to. Some of the members took the opportunity of ascending the scaffolding to study the detail of the tower and the arrangement of the buttresses and pinnacles and other features. The porch of this church is remarkable for the grace of its design and for its vaulting. Internally, the church is somewhat peculiar from the lack both of chancel arch and clerestory, the absence of the latter being an arrangement which is frequently found in Somerset, and makes a striking difference between these churches and those of East Anglian Perpendicular work. Kingston Church has a large amount of Early English work remaining, the nave arcade and piers being evidently those of the earlier church, which was remodelled in later Perpendicular times. The altar tomb of the Warre family, of Decorated character, in the south aisle should be noticed for the very large slab of Devonshire marble with which it is covered, and for the fine display of heraldry on the panels of the sides. The bench-ends in this church, of the date about 1522, are amongst the finest seen on the excursion, and strikingly illustrate the final struggle between Medieval and Renaissance detail, which was evidently prolonged in the West Country after its termination elsewhere.

From Kingston a long drive and walk took the party through the woods and over Cotelstone Hill to the Manor House and Church of Cotelstone (illustrated in our last issue). From the top of Cotelstone Hill a magnificent view is obtained of the Vale of Taunton, the Quantocks and Brendon Hills, the Bristol Channel, and parts of Dorsetshire, Wiltshire, and South Wales, which repaid the excursionists for their steep climb under a broiling sun.

Cotelstone Manor House, with its gateway, the small keeper's cottage, and the church form a highly picturesque group, but they are subjects rather for the painter than the architect, as the detail is, though peculiar and quaint, far from being remarkable for beauty. Still, for grouping, for effects of light and shade, and for colour, the buildings are not often surpassed. The interior of the house has been so completely modernised that all interest is lost. Cotelstone was for many years following the Conquest in the possession of the Stawels; and Sir John of that ilk, a famous and zealous adherent of the King at the time of the Great Rebellion, suffered largely at the hands of the victorious Parliamentarians under Blake for the prominent part he took in the contest. He lived, however, to see the Restoration, and was one of those who welcomed Charles II. at Charing Cross on his return. The eldest son of Sir John Stawel was raised to the peerage. Judge Jeffreys visited Cotelstone, and it is recorded that two gentlemen were hung by him before the manor house.

From Cotelstone the excursionists proceeded to Bishop's Lydeard, the church of which, as

may be seen from our last week's illustration, possesses one of the finest towers in Somerset, built in the reign of Henry VII. One of the best churchyard crosses remaining may be seen here, an example of fourteenth-century work. On one face of the shaft is a figure of St. John the Baptist, while the faces of the octagonal base are sculptured with representations of our Lord in Majesty, the Resurrection, and the twelve Apostles. The remains of the ancient village cross have also found a home in the churchyard.

The church has a rich screen of the Minehead and Dunster type, and of about the same date, with excellent carving. There are also a large number of very fine bench-ends, and a Jacobean pulpit of distinctly Renaissance character. There is a brass to the memory of Nicholas Grobham and his wife Eleanor, of about the date 1585. The font, of Perpendicular date, is remarkable for its decoration of strictly geometrical pattern, showing great fertility of invention, and a clever use of simple means for obtaining ornamental effect. The village derives its distinguishing title of Bishop's Lydeard from having been the possession of the Bishops of Bath and Wells until the time of Edward VI.

The visit to the fine church of Bishop's Lydeard closed the work of a very interesting and enjoyable day.

Saturday, August 20.

The Museum and Castle of Taunton having been visited, as we have mentioned, on Wednesday, there remained but little to be done on the last day of the excursion, for although the town of Taunton is of considerable antiquity, as is shown by the remains of early British work found there, it possesses now few architectural monuments. The Church of St. Mary Magdalen, with its fine tower (illustrated last week) is the chief architectural gem of Taunton. The tower was taken down to the ground and rebuilt between 1858 and 1862, and is certainly one of the richest in Somerset. Although there are remains both of the Norman work and of the Early English church built about 1270, St. Mary's, Taunton, is to all intents and purposes a Late Perpendicular church. It is one of the few churches in England with double aisles, and to this is due in a considerable degree the spacious effect of the interior. Most of the fittings are of quite modern date, and it is very instructive to note the loss of artistic effect in the modern highly-finished carved oak benches as compared with the more vigorous workmanship seen over and over again during the week. These new benches are so exact in the mechanical perfection of their workmanship that the ornaments appear to have been cast, and not carved.

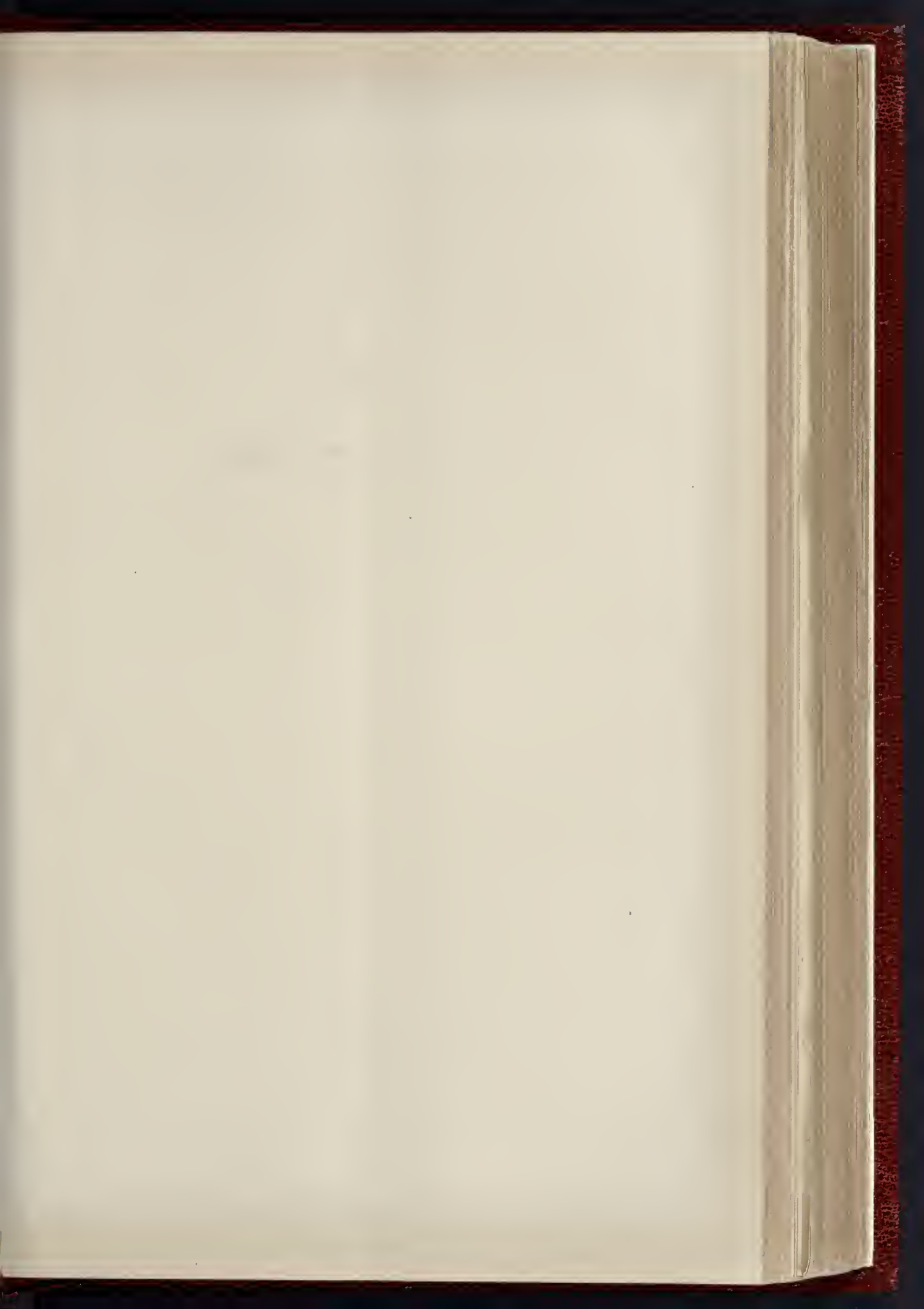
St. James's Church, Taunton (see illustration in last week's *Builder*) has a fine tower, though it is somewhat discounted by the surpassing excellence of St. Mary's. The interior is as cold and bare as that of the larger church is rich and magnificent, and there is scarcely anything to interest the architect except the font, with its carvings of the Crucifixion and the twelve Apostles (see sketch).

There are some remains of the Augustinian Priory, founded in 1127 by Bishop Giffard, and enlarged by Henry of Blois. These consist chiefly of fragments of Early Decorated work, and even these are not in their original position.

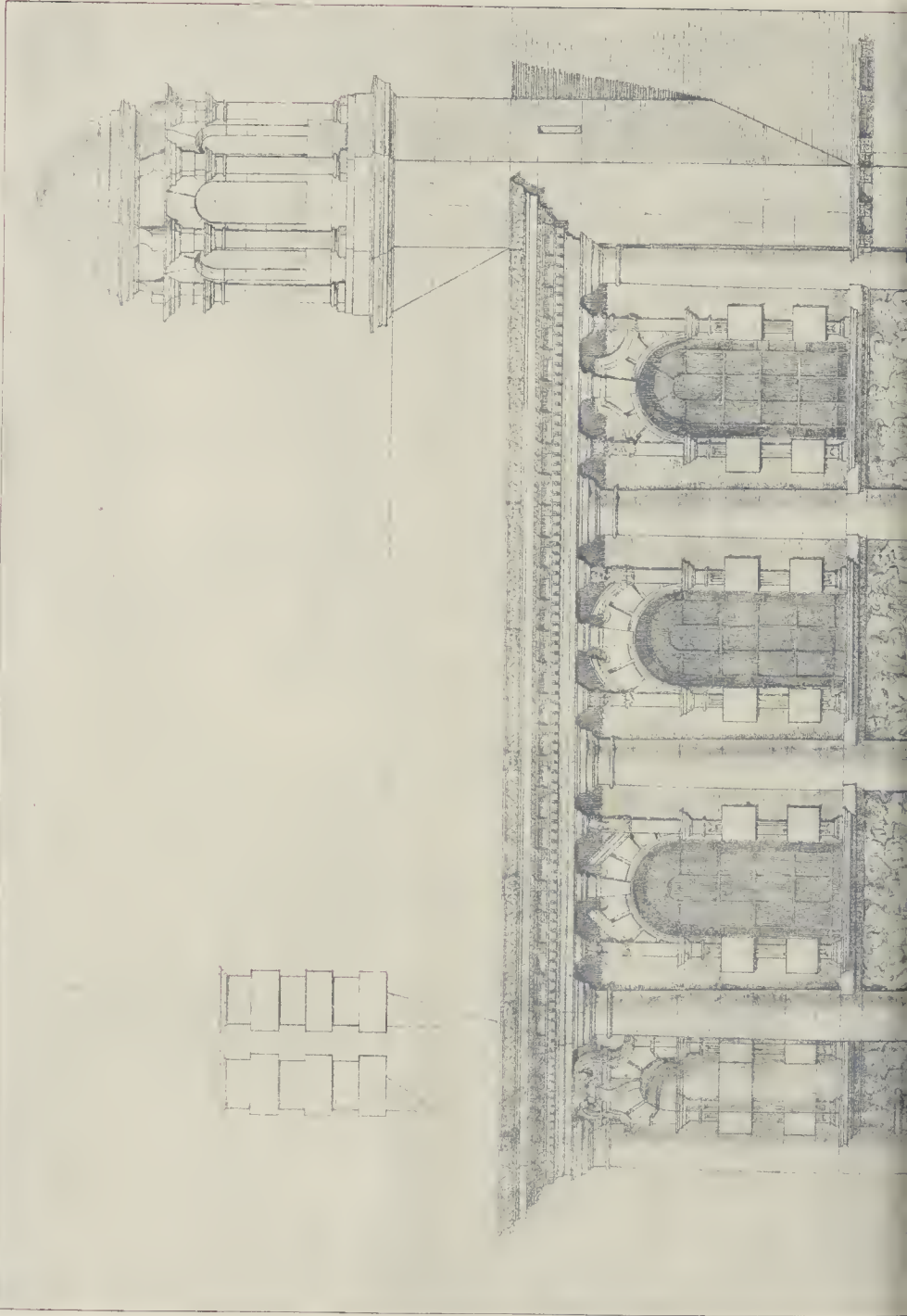
The timber-house formerly occupied by Colonel Kirke, of infamous memory, and the almost equally notorious Mannings, is the principal relic of the ancient domestic architecture of Taunton, though there are scattered throughout the town some few remains of timber-houses of picturesque form with overhanging pendants, but with little in the way of detail.

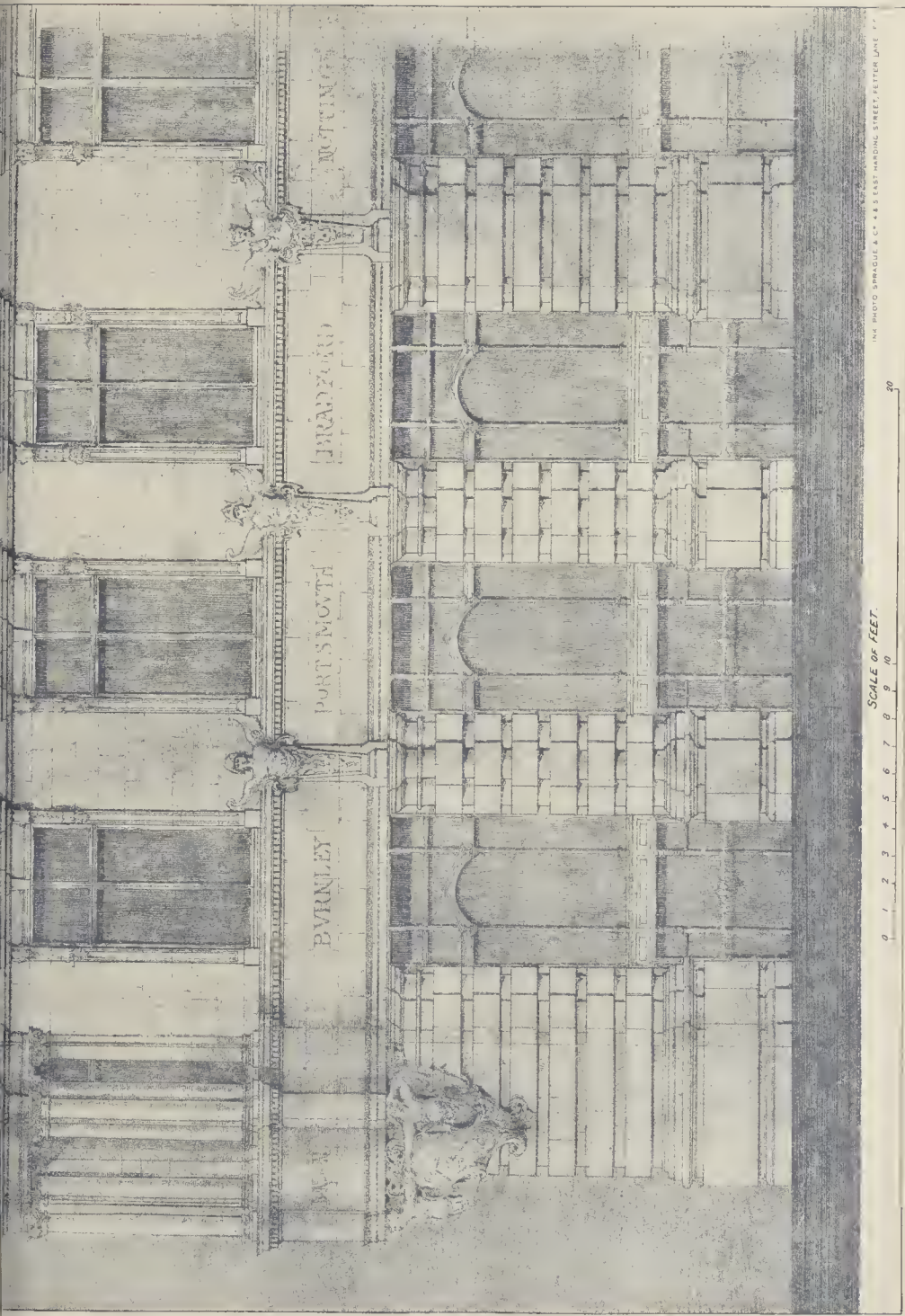
Thus the Architectural Association's excursion to Taunton once more proved the exceeding richness of the County of Somerset in fine architectural work, restricted though it be in date to the later Medieval and early Renaissance periods of our national architecture.

THE ENGLISH IRON TRADE.—In one or two branches of the English iron market a slight improvement in business is exhibited, and with regard to Scotch makers' iron, advances of from 6d. to 1s. are shown. Middlesbrough pig is also firmer. Little change has taken place in manufactured iron, while together with tin plates, is very quiet, and dulness is still the chief characteristic of the steel trade. Heavy rails are again lower. Shipbuilding generally is depressed, and engineers are only moderately engaged. The coal trade is rather quiet.—Iron.



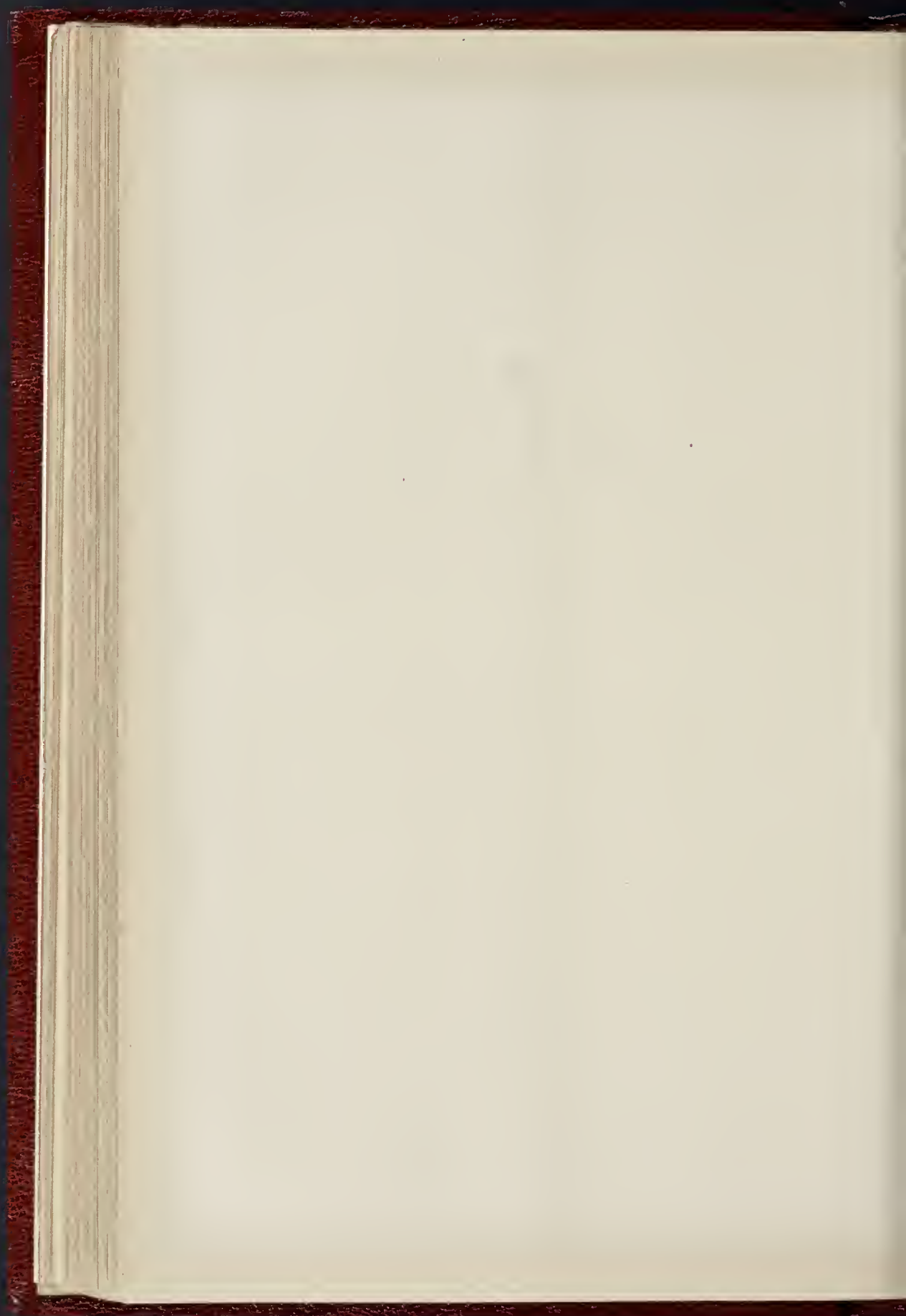
THE BUILOFR. AUGUST 27. 1892.





PORTION OF ELEVATION, INSTITUTE OF CHARTERED ACCOUNTANTS.—MR. J. BELCHER, F.R.I.B.A., ARCHITECT.

Royal Academy Exhibition, 1892.



THE BRITISH ARCHEOLOGICAL ASSOCIATION AT CARDIFF.

THE British Archaeological Association began its forty-ninth annual Congress at Cardiff on Monday last, August 22, under the presidency of the Bishop of Llandaff.

The acceptance of the invitation from the Mayor and Corporation of Cardiff was a wise act on the part of the Association, for the welcome has been a hearty one, while the programme drawn up by the local committee is of the most interesting description, including as it does a long series of objects of antiquarian interest of very varied description, not to be surpassed by those of any other district of Great Britain. Indeed, the difficulty of selection, where objects are so numerous, has been the most laborious work of the compilers of the programme. Cardiff appears to a stranger to be a town only of new buildings, but among the mass of these and the constant traffic of busy and prosperous trade, it is of interest to discover the fine ancient tower of St. John's Church, and to notice some portions of Medieval work in the elaborately restored Castle. Beyond these, it requires some powers of imagination to realise that Cardiff was once a walled town, and that part of the much-used canal of to-day is in reality the moat of the ramparts, long since demolished.

Bright sunlight and a clear sky made the commencement of the Congress delightful as the party of archaeologists left Cardiff for a series of visits to the west of the town, it being decided to begin the Congress thus, pending the arrival of members and friends at a later hour, or the day would have been lost to those who had previously arrived. The first visit was paid to the ancient mansion, Llantrithyd Place, now in ruins, although the building was all but perfect within living memory. It has now gone hopelessly to decay, a mass of ivy-covered walls only being left, with a few plastered mouldings here and there to show that the building was of Elizabethan date. The pleasure grounds and gardens are still to be traced. The restored church is close at hand, and it contains an admirable Elizabethan tomb-church and mansion were described by Mr. Stephen W. Williams. After a drive through beautiful country, Cowbridge was reached, and the large irregularly-planned church was inspected. It has a massive tower, central between nave and chancel, a few feet of the upper portion being octagonal in form, while the staircase is contained in a huge circular turret. The remains of the town walls, which are supposed to stand on Roman foundations, and the old south gate, were inspected. After luncheon the party proceeded, under the guidance of the Mayor of Cowbridge, to the fine gateway of St. Quintin's Castle,—early fifteenth century work,—after which a visit was paid to the little-known mansion house at Llanfihangel, a perfect building of the middle of the sixteenth century, of very irregular outline, and of most picturesque aspect. It stands in front of an old plantation of yew trees, while the quaint little parish church and an old wall are on the opposite side of the road of approach. The house contains some good panelling, and the hall has a plastered ceiling of moulded work. Mr. Williams pointed out a fourteenth century doorway, which showed that the house was of earlier foundation than might have been supposed from its more apparent features. The party then proceeded to Flemingston, another Elizabethan house, with older portions, of plainer work. This building also stands close to the parish church, in which is a curious fourteenth century monument. Progress was then made across fields to the ruined mansion of Old Beanyr, where, among many interesting features, there is a remarkable front to the entrance porch. The doorway has a four-centred arch, flanked by couples of columns on each side, of elaborate and enriched Doric work, below Ionic, and Corinthian above, the composition being terminated by a clock face, which has recently been made secure by the praiseworthy and timely work of its owner, Mr. Bassett, who met the party. Mr. E. Seward, F.R.I.B.A., the local secretary, pointed out the salient feature of the beautiful design, the date being 1600, after which tea was partaken of at the house of Mr. T. Mansel Franklin, at St. Hilary, and Cardiff was only reached at a late hour.

The official proceedings may be said to have commenced on Tuesday last, when the party,

in greatly augmented numbers, assembled in the Town Hall, where the Mayor of Cardiff, Mr. Alderman Thomas Rees, J.P., held a reception, and bade the visitors and their friends welcome in his own name and in that of the Corporation. Mr. Alan Wyon, F.S.A., hon. treasurer of the Association, responded, and progress was made to the railway station, the day being devoted to a visit to the ruins of Margam Abbey. On reaching Pyle station, carriages were in waiting to convey the party to their destination, the intention being to inspect on the way a celebrated stone with an ogam inscription, but this was abandoned, owing to the difficulty of bringing so large a party to the spot.

The site of Margam Abbey is one of great beauty, the valley in which it is situated being surrounded on two sides with high hills covered with foliage, while bright flowers and gardens extend around the ruined walls, the whole being enclosed in the private grounds of Miss Talbot's mansion. On their host's invitation luncheon was partaken of in the large orangery. After thanks had been rendered to Miss Talbot, proposed by the Mayor of Chester on behalf of the Association, and responded to by Mr. Knox, the party proceeded to the entrance of the Chapter House, which still retains its thirteenth century vaulting. Here, close to the spot where they must have been deposited for centuries, Mr. de Gray Birch, F.S.A., exhibited a remarkable series of ancient charters of the Abbey, which form a part only of the unique collection belonging to Miss Talbot, lent by her for inspection. Mr. Birch proceeded to describe some few of the documents, from which all the history of the Abbey is traceable. It was founded by Robert, Duke of Gloucester, in the year 1147, the year of the Duke's death, but the original settlement appears to have been on a different spot. Among many curious reports was an inscription drawn up at the demand of the parent house of Clairvaux, in which it was stated that the Abbey had suffered from demands from the Pope and from the King, as well as by the encroachment of shifting sands along the coast, and that its income was very much reduced. The number of monks and of converts are given. The date is long subsequent to the foundation. The documents enumerate a vast number of possessions belonging to the abbey, but at the Dissolution the income was only 181*l.* 7*s.* 4*d.* Mr. Loftus Brock, F.S.A., one of the honorary secretaries, then proceeded to point out the features of the monastic buildings, and said that, if the foundation had not been originally on the spot now occupied by the remains, it must have been very soon after that the earliest part of the existing work was built. Indeed, it is only by considering that the earliest work of the Cistercian Order was always of the plainest description that the singular plainness of the nave of the church can be accounted for. The original chapter-house was dispersed about the year 1200 by the remarkable twelve-sided building which still remains, the vaulted roof of which must have been a beautiful work. From its standing outside the line of the existing vestibule, the speaker concluded that the latter occupied the site of the older chapter-house. The presbytery, which had aisles, and the transepts, which had one aisle and two chapels each, had been rebuilt in a style of much artistic beauty, about 1240, in striking contrast to the plainness of the original work. The parish church (the original nave) is one of very few buildings of the Cistercian order still used for Divine service. Within the church, and elsewhere under shelter is a fine series of inscribed stone crosses, many being covered with beautiful interlaced patterns. These were described by Mr. T. H. Thomas, who earned the thanks of the meeting for boldly asserting that these monuments were likely to be as ancient as the similar patterns in the Book of Kells. "If designers could draw them on parchment, why could not masons cut the same patterns in stone?" Proceeding to Port Talbot, the party returned to Cardiff, having spent a day all too short for the examination of the treasures of Margam Abbey.

In the evening a meeting was held in the Town-hall, Dr. C. T. Vachell, Chairman of the Local Committee, presiding, when a paper on the Judicial Seals of the Great Sessions of Wales was read by Mr. Alan Wyon, F.S.A. It was illustrated by casts of almost the entire series. Mr. Stephen W. Williams afterwards described his recent excavations at Talley

Abbey, which have revealed the ground-plan, published in last week's *Builder*, p. 148. The proceedings terminated with a paper on the recent restoration of the old Priory Church at Chepstow, by Mr. J. Coates Carter, the architect who executed the works.

We will next week continue our report of the proceedings of the congress.

NEW RESERVOIR AT CLOUGH BOTTOM, LANCASHIRE.

IN connexion with the recent meeting of the Incorporated Association of Municipal and County Engineers at Bury, a visit was paid to the works of the new reservoir at Clough Bottom, now in course of construction under the direction of Mr. J. Cartwright, the Borough Engineer and Surveyor of Bury. A small coloured plan was handed round, showing the relative positions of the Borough of Bury and the several districts within the limits of the water supply, together with data concerning the names of the various reservoirs, the area of the gathering grounds, the area of the reservoirs, the level above Ordnance datum, the depth of the embankments, and the capacity. Calf Hey reservoir has a capacity of 22,500,000 cubic feet, Holden Wood 14,410,000, Harden Clough 2,240,000, Gin Hall 7,000,000, Chesham 1,500,000, Hapton 56,000,000, Clarke's Hill 1,240,000, and Clough Bottom 28,800,000,—a total capacity of 127,210,000 cubic feet. From these figures it will be seen that, so far as storage is concerned, Hapton reservoir is the largest, and Clough Bottom will be the next in size. The following interesting paper in regard to the new reservoir was submitted by Mr. Cartwright:—

The Bill authorising the construction of this reservoir was passed in August, 1889, and the works were commenced in May, 1891. The top bank is at an elevation of 1,015 ft. above Ordnance datum. The natural drainage area is 421 acres, and is augmented by an area of 315 acres brought in by a catchwater drain about a mile in length; the mean annual rainfall is 35 in., and deducting 14 in. for evaporation, there is an available fall of 21 in. for the purposes of the reservoir. The compensation water amounts to 540,000 gallons per day of twelve hours. The area of the top water is 32 acres, and the capacity of the reservoir is 202,000,000 gallons, allowing an available supply for 30,000 consumers of 25 gallons per day for 175 days. The main embankment contains some 217,000 cubic yards, has a maximum height of 76 ft., and a maximum width of 490 ft., with an area of 61 acres, and is 20 ft. wide at the top. The internal slope is covered with pitching varying in thickness from 12 in. at the top to 9 in. at a vertical depth of 35 ft. below, laid on shingling. The external slope from the top bank to the first henching is 2 to 1, from the first to the second henching 2½ to 1, and from the second henching to the toe of the bank 3 to 1, and it is drained throughout with earthenware pipes. The puddle wall is 7 ft. wide at the top, and batters outwards 1 in 12 on each side till reaching the natural surface of the ground, when it is sloped inwards at 1 to 1, until reaching a maximum width of 12 ft., at which width the trench is carried down. Where the puddle is less than 12 ft. in width, reaching the natural surface of the ground, the trench is carried at such less width. The puddle wall is backed on each side by fine material 20 ft. wide at its top, and battering outwards 1 in 4. The total length on top of the bank is 1,165 ft., and a road 12 ft. wide and footpath 3 ft. wide are carried across and over the by-wash by a bridge 12 ft. wide and 20 ft. span, and connected to the diverted highway. A storm-wall 4 ft. 6 in. in height, and curved to meet the pitching, is carried across the bank.

Tunnel and Shaft: The water from the reservoir is conveyed through the embankment by means of a tunnel 496 ft. in length, driven by means of the entire length in the solid. Its internal diameter is 5 ft. 6 in., and it is built of three rings of brickwork, the innermost being blue brick, surrounded by 12 in. of lime concrete from the inlet bay to the shaft, and from the shaft to the outlet bay by 12 in. of cement concrete. It is curved at each end to a radius of 90 ft., and goes in a straight line through the puddle trench, where it is supported on a concrete block carried down to the bottom of the trench. Where the inlet tunnel

joins the shaft the diameter is increased to allow of the construction of the stop-piece, which is built of brick work in cement 6 ft. thick, and through which two cast-iron pipes are carried, one 30 in. diameter, being for the relief of the reservoir, and one 15 in. diameter for the supply, the latter being carried to the mouth of the tunnel before being driven through its side and into the solid. The compensation water can be delivered from either of the pipes as occasion may require. The valve shaft is built entirely in cement, and is 11 ft. square for a height of 14 ft. from the bottom, and is there corbelled into a diameter of 8 ft., at which it is carried up to the level of the top of the bank, a further height of 57 ft. With the exception of the radial work in the tunnels, the whole of the shaft is constructed of masonry and concrete, and built into the walls of the shaft are two draw-off pipes, one at 20 ft. and the other 40 ft. below top water, together with the girders necessary for the support of the valves. The valves are in duplicate for each draw-off, the other valve in each case being worked by capstans from the top of the shaft and the inner ones kept in reserve. The valve shaft will be approached from the bank by a lattice girder steel footbridge of 50 ft. span, resting on a masonry pin on the bank.

By-Channel: For the purpose of controlling the flood waters, the by-channel diverts the two chief streams past the reservoir, and the total length of by-channel is 950 yards, varying in size according to the area drained, the by-channel section being 10 ft. wide and 5 ft. in depth, with side walls, before reaching the point where it passes under the catchwater. It is afterwards joined by the catchwater by-pass channel and there joins in the by-wash.

Weir and By-wash: The crest of the weir is 45 ft. in length, with walls 5 ft. high; and from the overflow to the centre of the puddle trench the by-wash is 21 ft. wide, paved with 15 in. squared pitching set on 12 in. of cement concrete. The by-wash is narrowed from 21 ft. at the puddle-trench to 15 ft. width, with side walls 4 ft. high, and paved with 12 in. pitching set on a bed of 12 in. of lime concrete, which form of channel is carried down to the gauge basin, which is placed immediately below the junction of the tunnel, outlet channel, and the by-wash. The total length of the by-wash is 800 ft.

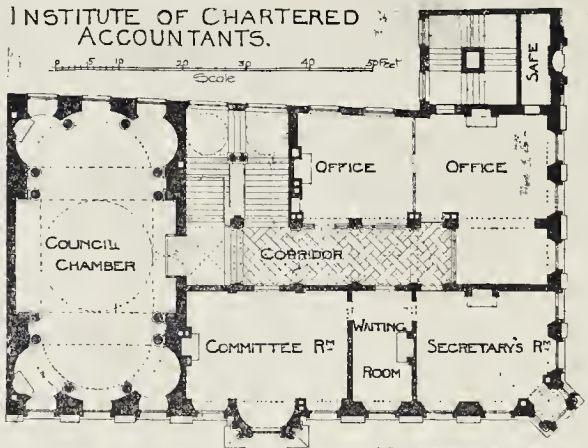
Catchwater: The catchwater, which is in length 1765 yards, is of various widths and depths, and with side slopes of 1 to 1 paved with 9 in. squared pitching set on 6 in. of lime concrete. There are seven streams taken into the catchwater, an intake being provided for each, with a pyramidal filter of rubber for the stoppage of wreckage brought down by floods, and made watertight from sewage. The catchwater is carried under the road diversions by bridges 14 ft. span and 36 ft. span, and over the by-channel by another bridge, 9 ft. 6 in. span and 7 ft. wide; and from there, into the reservoir, two shutters are placed, one in the catchwater and one in the by-pass channel, near to the crossing of the catchwater over the by-channel, for the controlling of the flood waters of the catchwaters.

Road Diversion: The position of the weir, by-wash, &c., necessitates the diversion of the highway leading from Newchurch to Burnley for a length of 487 yards, a portion of which is in cutting 25 ft. deep.

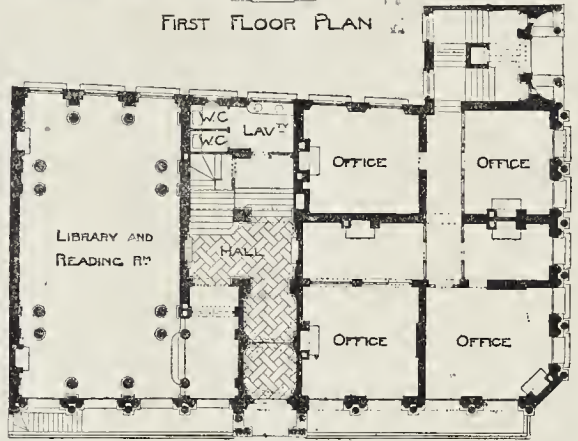
Boundary Walls: The property of the Corporation will be enclosed by a rubble wall 6 ft. in height, 7,650 yards in length.

Pipe Lines: The pipe-line from the reservoir to Rawtenstall, the point of junction with the existing mains of the Corporation, will be in length 8,980 yards of pipes, varying in internal diameter to 14 in., having a total weight of 1,600 tons. The pipes will be the ordinary socket and spigot pipes, and the air valves of the three hall type hydrants, &c. The pipes cross a number of bridges which span the streams. The first contract has been let to Mr. Enoch Tempest, of Matlock Bridge, and includes the construction of the main embankment, inlet and outlet tunnels and channels, valve-shaft, road diversion, catch-water and by-pass, by-channel, and by-wash, but includes no ironwork.

BILSTON MARKET HALL.—At a meeting of the Bilston Township Commissioners, held at the Town Hall, on the 18th inst., it was unanimously resolved "That the sum of £50,000, be presented to the Surveyor (Mr. C. L. N. Wilson, C.E.), for his services in designing and superintending the erection of shops and stalls, &c., in the New Market Hall."



FIRST FLOOR PLAN



GROUND PLAN

Illustrations.

THE INSTITUTE OF CHARTERED ACCOUNTANTS.

THE illustration of a portion of the new Institute of Chartered Accountants is from Mr. Belcher's own drawing, and is a study for the work which is now nearly completed. The frieze which runs along the whole of the building under the second floor windows is being carved by Mr. Hamo Thornycroft, R.A., and the caryatides above the ground-floor, and other figures, are being carved by Mr. Harry Bates, A.R.A. The subsidiary carving is by Messrs. Farmer & Brindley. The building is in Portland stone, and is being carried out by Messrs. Colls & Sons, of Coleman-street, E.C., Mr. G. Smith being the clerk of the works.

SCULPTURAL GROUPS: "LA LIBERTÉ," "LA FRATERNITÉ."

THESE groups form a portion of the colossal fountain designed by M. Peynot for the town of Lyons, to be erected "à la gloire de la République," a half-size model of the lower portion of which formed one of the most prominent sculpture exhibits in this year's Salon. The groups, representing "Liberty" and "Fraternity," stand on opposite sides of the circular column or stele which forms the central feature of the monument, the groups looking opposite ways, outwards from the column, which separates them.

We hope to be able on some future occasion to give a large illustration of the whole design, which is still in process of completion, and will form one of the most important works of modern French monumental sculpture.

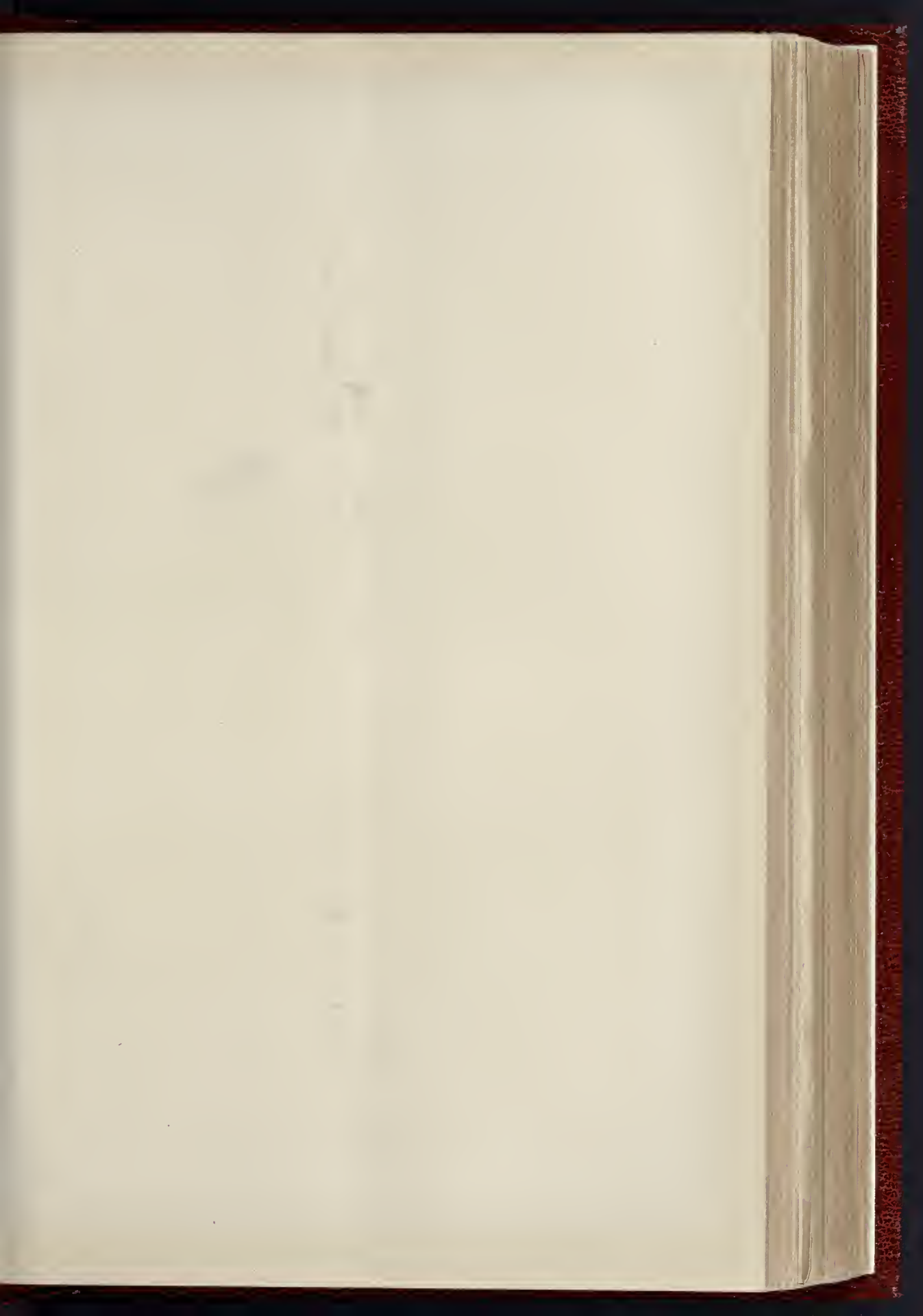
ANCIENT METOPES FOUND AT SELINONTE.

WE give an illustration of two out of the three metopes which were discovered a short time since at Selinonte, in the course of some excavations made by order of the Italian Government. Nothing of importance was discovered this year in regard to the ancient topography of Selinus, but three ancient metopes were discovered at the northern entrance of the Acropolis. According to Professor Salinas, the curator of the Museum at Palermo, the temple to which these metopes belonged must have been destroyed at a very early date, as the metopes had been used as building materials in the fortifications erected by Hieroclates at the northern entrance of the Acropolis, after the original walls had been destroyed by the Carthaginians in the latter part of the fifth century B.C.

The metope marked A represents a single figure of a winged sphinx; the second one, B, is an archaic representation of the legend of Europa.

The third metope which was discovered had apparently been built into the outside face of the fortification wall, and is so much obliterated that it was hardly worth while in this place to add an illustration of it, as the subject is all but effaced.

The metope which embodies the legend of Europa is every way the most remarkable of the three,—it is indeed, we may safely say, one of the finest pieces of archaic work we possess; it is further, so far as we are aware, the only instance of the representation of this particular myth on a relief. The myth of Europa we say advisedly, though it is by no means safe to call every work of art that represents a woman



THE BUILDER, AUGUST 27, 1892.



GEORGIUS MUSGRAVE ARMIGER
Annos plusquam Tringinta
Trimestres, nec non Generales SOMERSETIÆ
Conventus ad Pacem
Celebravit.

Iustitiam (quantum penes se fuit)
Omnibus

Equa lance libavit:

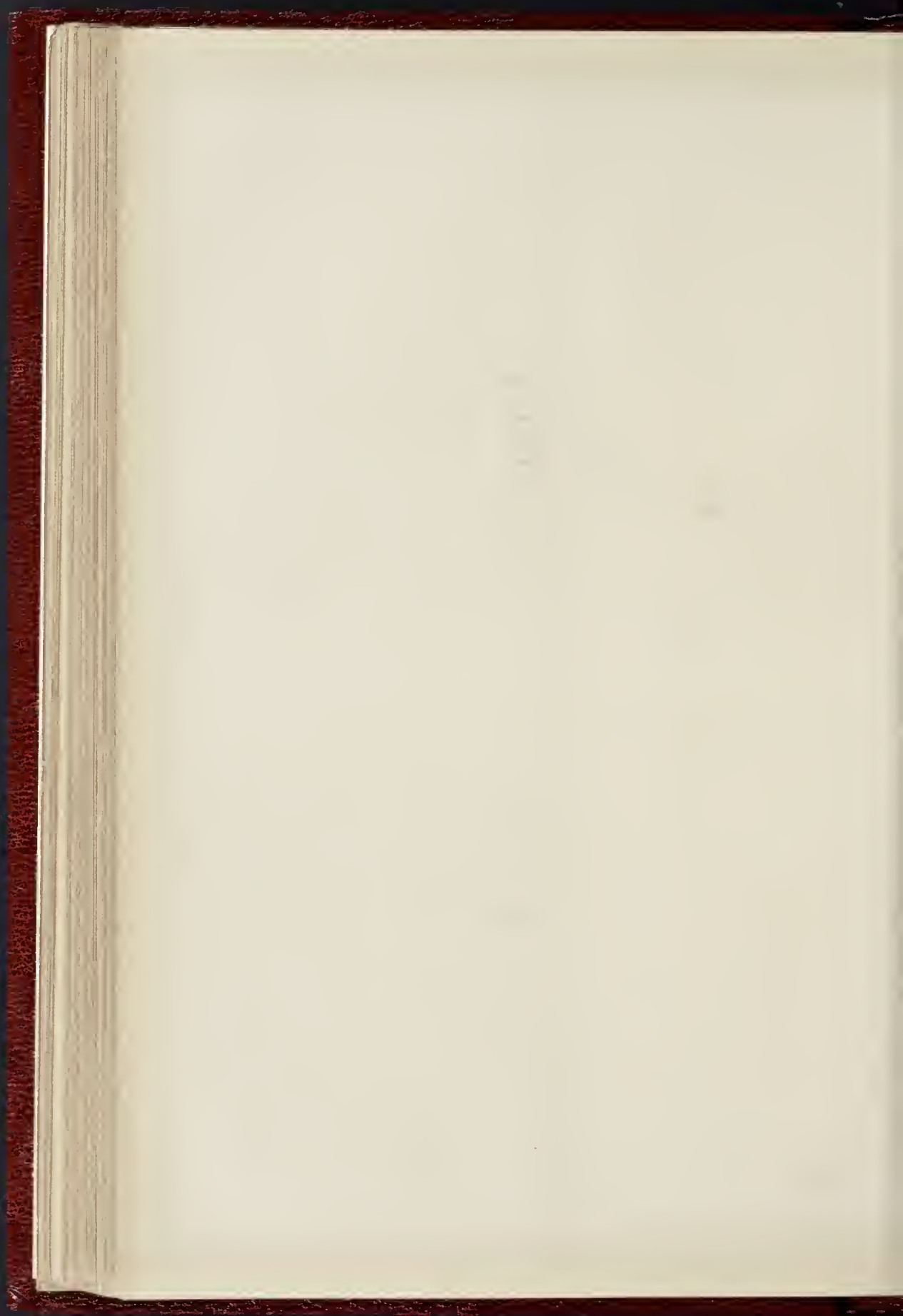
SIBI ac etiã CONSORTI CHARISSIMÆ
Hoc VIVUS Monumentum extruendum
Curavit

Obiit 29 die Novembris A. S. Lxxiiij
Annoq3 Dom: M D C C X X I.

John
Pettifer

PHOTO-LITHO BRADDE & CO. 4 & 5 EAST WINDING STREET, PETERBOROUGH

MONUMENTAL SLAB IN STOGUMBER CHURCH, SOMERSET





THE BUILDER AUGUST 27, 1892.



"LA LIBERTÉ."



"LA FRATERNITÉ."



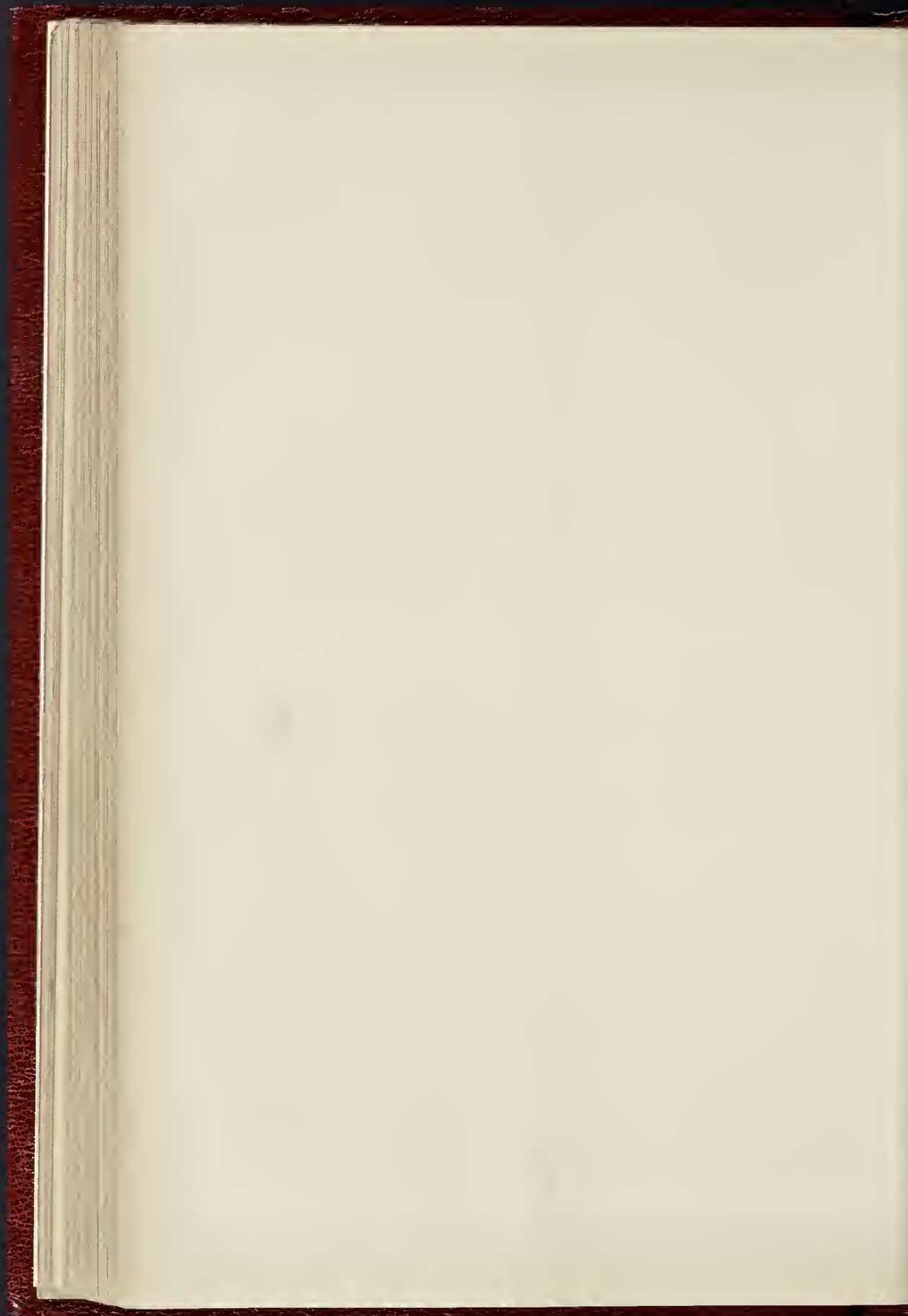
A. A WINGED SPHINX.

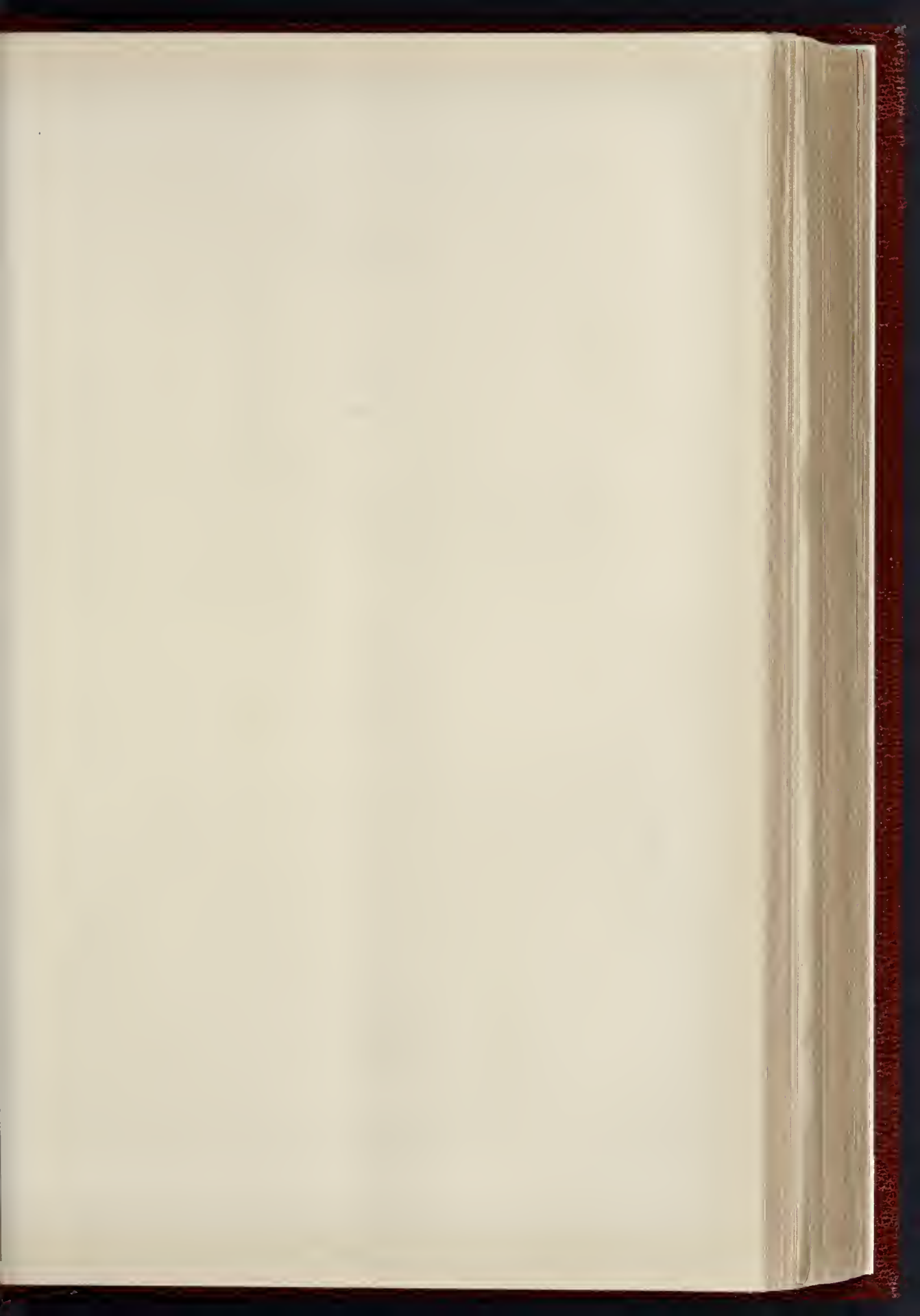


B. EUROPA.

THE PHOTO SPRAGUE & CO. 4 & 5 EAST HANDED STREET, FETTER LANE, E.C.

ANCIENT METOPES LATELY DISCOVERED AT SELINONTE.







DUNSTER CHURCH, SOUTH-EAST VIEW.



CLEEVE ABBEY, REFECTORY, SOUTH SIDE



MINEHEAD CHURCH, SOUTH-EAST VIEW.



CLEEVE ABBEY, REFECTORY, FROM THE CLOISTERS.

INK PHOTO SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.



The Alliance Assurance Offices, Abbeygate-street, Bury St. Edmunds.—Mr. J. S. Corder, Architect.

riding on a bull by that name. In this case, however, the attribution is certain, as the bull is swimming through the sea, clearly indicated in arabic fashion by the two large dolphins between his front legs. He is, as Moschos describes him, "faring with unvetted hooves over the waves." Europa herself is represented, according to a well-established type, with one hand depressed, the other holding the bull's horn,—as she appeared on the walls of the Palace of Art.—

"From one hand drooped a crocus, one hand clasped
The mild bull's golden horn."

Only here the depressed hand seems to serve the purpose of steadying Europa's seat.

In style this metope, as Professor Salinas has already pointed out, contrasts most favourably with the somewhat coarse and clumsy vein of the other arabic metopes of Selinus preserved in the Palermo Museum. Decoratively, very fine use is made of a subject which, oddly enough, though the vase painter felt and developed all its decorative capacities, was neglected by the sculptor. Nothing could well be better than the filling of the space, and the skilful use made of the many motives, the tail, hands, feet, and hooves. It is noticeable that the bull here, and we believe here only, is winged, and this may point,—though archaeologists are nowadays unwilling to dogmatise on this matter,—to Oriental influence. Anyhow,

we shall not be wrong in dating the sculptures as late seventh or very early sixth century B.C.

SLAB, STOGUMBER CHURCH.

THIS very fine example of a memorial slab is now placed against the south wall of the south chapel in Stogumber Church, Somerset. Its material is black marble, with the lettering and shield-of-arms delicately incised. The whole slab measures 5 ft. 4 in. in length, and 2 ft. 10 in. in breadth. The illustration has been reduced from a full-size drawing.

SOMERSETSHIRE ARCHITECTURE:

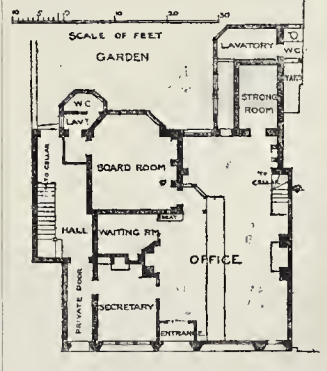
CLEEVE ABBEY; DUNSTER AND MINEHEAD CHURCHES.

IN further illustration of the Architectural Association's excursion in Somersetshire last week, we give two views of Cleeve Abbey, from photographs by Mr. Fribb, and also a view of Dunster Church, from the south-east. The view of Minehead Church shows that building as it appeared before the recent restoration.

ALLIANCE ASSURANCE OFFICES, BURY ST. EDMUNDS.

THIS building has been recently erected at Bury St. Edmunds by the Alliance Assurance Company, to supplant their old offices in the

Ground Plan



Market-place, they having been found insufficient for their purposes. The site of the new office is in the Abbey Gate-street, next the National Provincial Bank, and it has a street frontage of 45 ft.

The ground floor, as may be seen by the accompanying plan, is devoted to the purposes

of the Company's business, whilst the two upper floors form the residence of the local secretary and manager. The lower story to the street is faced with Lancashire red sandstone, and above the office windows runs a boldly carved frieze of Lawrence's rubbers, 2 ft. 6 in. deep, having a cornice of stone above it. The upper part is faced with red brick, relieved with moulded and ornamental strings and panels. In each of the two front gables is an oriel bay window springing out of the carved frieze and running up two stories, and over each of the latter is a stone panel having the sign of the Company carved thereon, a castle, with the motto "Multi Societate Tintiores." The roof is covered with Broseley tiles. All the internal fittings are of polished teak.

The builders were Messrs. Shillitoe & Son, Bury St. Edmunds, and the architect Mr. John Shevell Corder, of Ipswich.

The old buildings which stood upon the site previous to the erection of the present structure were curious and interesting, being of seventeenth-century timber-framed construction. The cellars beneath the front part were formed of chinch stone walls, and, on these being taken down the stones were found to have carved on their inner faces much elaborate work, traceried panels, caps of columns, and other details. The probable solution of this discovery is that these stones at one time formed part of the internal decoration of some of the sumptuous chambers of the old Abbey at Bury, and they were abstracted from the latter place when it was demolished. It is no uncommon thing to find in the houses at Bury traces of this wholesale spoliation. The inhabitants evidently used it as a convenient stone quarry for many years. J. S. C.

Books.

A Catalogue of Sculpture in the Department of Greek and Roman Antiquities. By A. H. SMITH, M.A., Assistant in the Department of Greek and Roman Antiquities in the British Museum. Vol. I. London: Printed by order of the Trustees. 1892.

MR. A. H. SMITH is at present chiefly known to the public by his excellent catalogue of the ancient gems of the British Museum: the present catalogue will certainly increase his reputation as a careful and exact worker. It is an admirable system by which the Keepers of the various departments entrust to their subordinates the compiling of catalogues,—the assistant keepers have time at their disposal which the heads necessarily lack, and the compiling of a catalogue compels that minute observation of fact, that subordination of theory, which is the best training for the young archaeologist.

The present volume includes by far the most important of the British Museum sculptures, *i.e.*, the archaic works, those of the Parthenon and other Athenian buildings, the remains of the temple at Phigaleia, the Greek reliefs, and "some other sculptures, yet, though produced in Roman times, represent Greek originals of the great age." In the section which deals with the sculptures of Athens much has been retained, we are told, from Sir Charles Newton's "Guide to the Egin-room." This seems a mistake, inasmuch as the conditions are different. Sir Charles wrote and described in the tradition, and the sound tradition, of days when photography was not; the cataloguer of to-day writes for a public which has, or can have if it will, a photograph of every sculpture of importance before him. Take an example. Sir Charles, in his Guide, writes (p. 39), describing the frieze of Lysicrates, "In the centre of the composition is Dionysos turned to the left, reclining on a rock over which drapery is thrown. He leans on his left elbow, with his right hand he caresses a panther which has sprung on his lap and raises his left paw." Well and good for the olden days, when the distant archaeologist could learn only by description. This description Mr. Smith copies verbatim, only altering the equivalent phrase into "a panther which fawns on his knees." Now, whom does it profit to be told that Dionysos is turned to the left, that he leans on his left elbow, that he caresses with his right hand? Not the visitor to the galleries, who, if he cannot see thus much, had better save his time and his money, stay away from the

Museum, and buy no catalogue. Not the foreign archaeologist, who possesses reproductions of the frieze by the dozen in countless publications. In the name of the public that has to pay for two large volumes in place of one, we protest against a system which involves vain repetitions.

So much by way of criticism, and we may say at once that for the rest we have little but praise. Omissions in hithography we note here and there, but in a work which must have been long on the stocks it is hard to say whether this or that recent publication appeared in time for incorporation. We see no reference to Dr. Fartwängler's most interesting interpretation of the figures of the west pediment of the Parthenon, to which last year we drew attention. Mr. Smith frequently cites Sauer's investigations of the tympana, which appeared just at the same time that Dr. Fartwängler's paper was reported in the *Berlin Archæologische Anzeiger*. Whether accepted or not, it is far too able and interesting to be ignored.

The catalogue, however, is a mine of information; the introduction is devoted to the history of the collections brought down to the most recent additions therefrom the Naukratis excavations; the grave reliefs have a valuable and most readable introduction, a chapter most necessary for the understanding of the sepulchral art of a people whose views of death differed so widely from our own. Throughout, in the discussion of temple sculptures, there are plans and diagrams scattered through the text which make the position of the sculptures and the significance of the temples themselves intelligible. Anyone who has attempted hitherto to explain such matters to the uninitiated has known how difficult, unless by the aid of costly diagrams, was the task. The British Museum has long possessed a model of the Parthenon (though not a very good one), but for the Thesion, the Nike Apteros, the Temple of Apollo at Phigaleia, &c., &c., no material for elucidation was at hand. Not only are there plans of the various temples given, but in the illustrations at the end are views of sites, restorations, &c.,—*e.g.*, the said Temple of Apollo is given in its wonderfully impressive surrounding, and the Harpy Tomb at Xanthos as it was when Scharf drew it. Most of these views could be seen by students in the Print-room, but how many went there to study them? Mr. Smith's book almost makes lectures superfluous, so full is the information and so plainly and pictorially is it set forth.

In a book like this, where with a wise moderation little beyond fact is set down dogmatically, there is no scope for the reviewer's contention. We can only say that if we have quarrelled with certain principles of method, we are, and the public should be, profoundly grateful to the Department's Head Keeper, and able assistant for a most valuable help to the understanding of the national collections.

Die Stadtgeschichte von Athen von Ernst Curtius. Mit einer Uebersicht der Schriftquellen zur Topographie von Athen von A. Milchhoeffer; mit 7 Kartenblättern gezeichnet von J. A. Kampert und 32 in den Text gedruckten Abbildungen. Berlin: Weidmannsche Buchhandlung, 1891.

PROFESSOR CURTIUS in his preface states very clearly the intent and gist of his book. It is to be "a topography of Athens from the historical point of view." As such it fills a very distinct gap in archaeological literature. The various histories of Athens naturally eschew minute topographical description. Guide-books to the antiquities of Athens give but meagre historical prefaces. The recently-published work on the "Mythology and Monuments of Athens" (Harrison & Verrall), is bound, by its close following of the narrative of Pausanias, to be non-chronological. Professor Curtius alone sets before us the *making of Athens*, as evidenced by its monuments and topography. The history of the city is told in six chapters, extending from Solon to Pausanias, with an introductory chapter on the mythical period before Solon. This is further prefaced by an account of the geographical life of the city. Not the least valuable portion of the book is the admirable collection of sources by Dr. Milchhoeffer. Anyone who has worked over the ground, and who knows the labour of constant reference and verification of quotations from scholiasts, lexicographers and the like, will be grateful to have these references once and for all collected

together. The work was done long ago for the Acropolis in Jahn's "Descriptio," but for the rest of Athens it is now accomplished for the first time.

The completeness of the material, and the excellence of the various plans and sketches, are to our minds the chief merits of the work. That to this is added vivid presentation and poetical imagination, no one who knows the history of Greece by Professor Curtius will need to be told. As to moot questions of topography, we are at issue with the author as to the ancient Altar of Zeus in the Pryx, as to the so-called "Thesion," as to the disposition and lie of the market-place, and, most of all, as to the Panathænaic way, where our opinion has been made a certainty by recent excavations.

W. Helbig and Emil Reisch. Führer durch die öffentlichen Sammlungen Klassischer Alterthümer in Rom. 2 vols. Leipzig: Baedeker. Those who intend to visit Rome during the coming winter had better possess themselves betimes of Dr. Helbig's new catalogue of antiquities. It necessarily supersedes all others in so far as the Government collections go. The Papal collections remain unmodified in their arrangement by the hand of modern science, but the Government collections have recently undergone complete remodelling, and owing to the building of two entire new museums, even those who know their Rome well will now find themselves at fault in hunting up their old favourites. Dr. Helbig's work catalogues only the contents of public collections; that of Matz and Dühn must still be used for private collections. The public collections dealt with are those of the Vatican (which Dr. Helbig, for convenience, includes, though it is, of course, papal), the Capitol, the Lateran, the Palazzo dei Conservatori, the Albani and Borghese villas, the Spada Palace, and the collections of the Boncompagni, the Thermo, and the Collegio Romano. Of the formation of the two new museums, the Villa di Papa Giulio and that of the Terme Diocleziane, we gave some account last year. It may be sufficient to remind our readers that to the Villa di Papa Giulio have gone the results of the more recent excavations, *e.g.*, those made since 1886 at Civita Castellana (Falero), the contents of the Palestrina tombs, and those at Marsciano, while at the Museum of the Terme are gathered together objects previously scattered in the Kircheranum Museum, and those of the Palatine and Esquiline,—besides more recent acquisitions found within the limits of actual Rome. Dr. Helbig's aim is best set forth in his own words, which we translate:—"The present work aspires to serve as a guide to younger archaeologists, and to the educated public generally; it aims at drawing attention to the more important monuments in the various Roman museums, and helps to their comprehension by brief elucidations of a character suited to the present state of archaeological science." How much a guide of this nature is needed every one will readily own who has tried to use the old-fashioned, high-flown compilations in Italian. It is only a pity that the work has perforce to run to two volumes. The first contains the Vatican, Capitoline, and Lateran collections; the second the smaller and more recent museums. Dr. Emil Reisch takes up the minor antiquities, vases, small bronzes, &c.; his introductions to these various branches are so fresh, lively, and clear that they are specially pleasant reading.

Otto Denardorff and Georg Niemann. Das Heroin von Gijlbachsch Tyrus. Sonderdruck aus dem Jahrbuch der Kunst-historischen Sammlungen des Allerhöchsten Kaiserhauses. Mit 31 Taf. und Mehrers Abbild im Text. Wien: Holzhausen.

We have so frequently called attention to the Gijlbachsch sculptures that it only remains to us now briefly to welcome their complete publication. A first glance at the plates that represent the curious and interesting double frieze that decorated the monument is most disappointing. The plates are not reproduced by any photographic process, but have been drawn first and then engraved. This method of illustrating sculpture has now a curiously old-fashioned air. It was, however, a most unfortunate necessity. The sculptures were in such an obliterated condition that had they been reproduced by any mechanical process they would have been for

the most part unintelligible. The text contains a detailed account of the expedition, and full discussion of the subject-matter and style of the sculptures. Dr. Bonndorf further gives us a comparison, in many respects an instructive one, between the composition of the sculptures and the wall-frescoes of Polygnotus, as known to us from literary tradition.

Correspondence.

To the Editor of THE BUILDER.

RIPON CEMETERY COMPETITION.

SIR,—It may be of interest to some of your readers who submitted designs in this competition to know that the Corporation of Ripon, having approved of the award given by the assessor (Mr. George Corson, of Leeds), have instructed their City Engineer to carry out on (the pre-mentioned) plans, and to prepare the necessary working details.

This course has been adopted by the Corporation on the ground that they considered the charges we required for the usual services in carrying out the works,—viz., those adopted by the Royal Institute of British Architects,—were excessive. What the Corporation expected our charges to be we cannot imagine.

We beg to suggest that it would be advantageous to architects if they would withdraw or withhold themselves from competitions if the conditions do not state that the successful competitor will be employed to carry out his design if adopted, or that a reasonable remuneration will be paid for the design instead of a nominal premium should another member of the profession be employed to carry out the works according to that same design.

H. F. CLARK & HUTCHINSON.

London, August 24.

"CAPITAL AND LABOUR."

SIR,—Amazement like my own must have struck many on reading what we were told under the above heading, on page 156 of last Saturday's *Builder*.

That there should be paid, in the United States, wages by the hour for labour on raw material at rates which bring up a year's earnings to sums ranging from 757l. 10s. to 240l. per man is alone enough to cause great astonishment, but that under such terms there should take place a strike for an advance of wages, a strike marked by every worst feature of violence and dishonesty which can be associated with such things, seems almost incredible; yet so matters have sped at the Pittsburgh Ironworks, while all English journals save your own seem to have kept their eyes closed to the facts. For, after reading your paragraph, I found in a leading daily paper, also on Saturday, an article which added bewilderment to my amazement, as it stated:—"All these strikes tell the same story. The workmen at Mr. Carnegie's place . . . struck against a prospective reduction of wages. They had already reached hunger point!" &c., &c. And this appeared in a paper noted usually for the extent and accuracy of its foreign information, while in the present case its readers are led to infer that the cost of the necessities of life have become so enhanced through the altered tariff of the States as to have thrown these poor workmen into their present miserable condition!

We know something here of the mischief caused by strikes, and those of us who have had opportunity and occasion during long years for tracing their connexion with the vices of trades unionism know, too, the deep demoralisation and degradation wrought among English workmen by that system; and those are to be thanked who, like yourself, place the results of these combined evils in their true light, and these results should surely be a warning to those who, from any motive, support or countenance them.

A CONSTANT READER.

August 22, 1892.

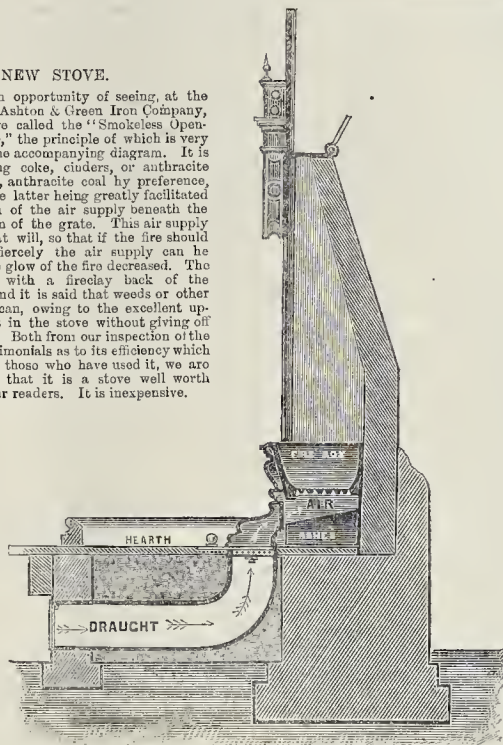
BUILDING-BLOCKS FOR ARCHES.

SIR,—Reading in the train the *Builder* of August 13, I was struck, on arriving at Fountains Abbey ruins, at the similarity of the notched arch stones over the two fireplaces of the kitchen, and the drawings given upon your page 135. Pointing these out upon the spot to an American present, he said "it was clear that the monks had pirated Mr. Holloway's patent."

R. O.

A NEW STOVE.

WE have had an opportunity of seeing, at the show-rooms of the Ashton & Green Iron Company, a new patent stove called the "Smokeless Open-Fire Hygienic Stove," the principle of which is very clearly shown by the accompanying diagram. It is adapted for burning coke, cinders, or anthracite or bituminous coal, anthracite coal by preference, the ignition of the latter being greatly facilitated by the introduction of the air supply beneath the floor to the bottom of the grate. This air supply can be regulated at will, so that if the fire should be burning too fiercely the air supply can be diminished and the glow of the fire decreased. The stove is provided with a fireclay back of the "Teale" model, and it is said that weeds or other vegetable matter can, owing to the excellent up-draught, be burnt in the stove without giving off any noxious odour. Both from our inspection of the stove and from testimonials as to its efficiency which we have seen from those who have used it, we are inclined to think that it is a stove well worth the attention of our readers. It is inexpensive.



The "Smokeless Open-Fire Hygienic Stove."

ST. HELEN'S CHURCH, BISHOPSGATE.

SIR,—I find that the ancient and interesting Church of St. Helen, Bishopsgate, is in a state of disruption, the monuments, the seats, and the stone and tiled floors having been removed, and the ground under the floors excavated to a considerable depth. It is stated that the main cause for so much disturbance is the instability of the structure. Operations on such a scale in such a place will probably lead to discoveries and raise questions interesting from an artistic and antiquarian point of view.

I for one,—and the majority of your readers, who cannot fail to be interested, I am sure,—would thank you for some information on the subject.

WM. STREDWICK.

Kestrel-avenue, Herne Hill, August 22.

. As was stated in a "Note" which appeared in the *Builder* for February 27 last, p. 155, the works in progress are under the direction of Mr. J. L. Pearson, R.A. The works have involved the removal of the human remains interred beneath the church to the City of London Cemetery at Ilford.

probability, better burnt. From many experiments carefully made with different cements and by different operators, Mr. Grant discovered the curious fact that briquettes composed of a certain quantity of Portland cement mixed with three times its weight of sand were not as strong as briquettes made with the same quantity of sand and mixed with only that portion of the original quantity of cement which would pass through a sieve of 5,806 meshes to the square inch. Thus,—taking a cement which leaves 10 per cent. residue on such a sieve,—we have in the first case the proportion of cement to sand as I is to 3, but in the second case the proportion becomes as 100 is to 3, or as I is to 3.3, and yet the latter yields the stronger mortar. This simply means that the sand offered a better surface to the adhesion of the fine cement than did the coarse grains of cement.

Another fact which has been demonstrated is that cements containing coarse particles may have a higher tensile strength than the siftings of the same cements when all are tested neat; but when all are tested with three or more times their weight of sand the values are reversed. Among many experiments in proof of this we may instance those of Messrs. Dyckerhoff, which showed that a cement which left 10.2 per cent. on a sieve having 400 meshes to the square centimetre (2,530 meshes per square inch), and 18.9 per cent. on one having 900 per square centimetre (3,806 per square inch), was, at the age of twenty-five weeks, 41 per cent. stronger than the same cement sifted through 5,000 meshes per square centimetre (32,200 per square inch), both being tested neat; but, when both were tested with three parts of standard sand, the briquettes made with unsifted cement were 29 per cent. weaker than those made with the siftings.

When the importance of fineness was first recognised in England, a sieve, which to-day would be considered very coarse, was frequently specified,—namely, a No. 40,—that is to say, a sieve having 40 meshes to the lineal inch, or 1,600 to the square inch. Then a No. 50 sieve (2,500 meshes per square inch) was advocated,

The Students' Column.

CONCRETE.—IX.

ARTIFICIAL CEMENTS (continued).

PORTLAND: FINENESS.

THE importance of fine grinding is now universally conceded. It is only the finely-ground portion of cement which has any cementitious value. The coarse particles resist the action of the water, and are really as worthless as so much sand. They may, moreover, be a source of danger to the work in which they are used. If the coarse particles be sifted from a sample of cement, and mixed with water, it will be found that they will not set, but will simply dry to a gritty powder. In composition, however, they are practically the same as the rest of the cement, and if they are ground fine and then mixed with water, they will set as a good cement does, and will probably prove even stronger than the siftings from which they were separated, the reason for this being that they are, in all

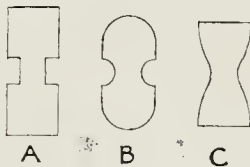
and now it is considered best to test the cement by sifting it through a No. 75 sieve, having 5,625 meshes per square inch. Dr. Michailis asserts that if a cement which has all passed a No. 40 sieve be sifted through a No. 75, the particles remaining on the latter will be "absolutely valueless as a cementitious agent. German cement manufacturers have long been ahead of the English in this matter of fine-grinding; in that country and in Austria the standard of fineness is that not more than 10 per cent. shall remain on a sieve of 900 meshes per square centimetre (5,806 per square inch), and to such perfection is grinding now carried in Germany that some cements leave less than 10 per cent. on a sieve having 32,000 meshes per square inch. Mr. Colson goes so far as to advocate that there shall be no residue at all on the sieve; in other words, that manufacturers must sift the cement, and return all residue to the millstones.

Mr. H. K. Bamber, F.I.C., in a paper read before the Institution of Civil Engineers in November, 1891, insists that cement should be so fine that all will pass through a No. 50 sieve, and that not more than 10 per cent. will be retained by a No. 75 sieve. This, it will be seen, is nearly equal to the German standard; but when we consider the worthlessness of the coarse particles and their worse than worthlessness—the loss of strength and the possible danger which they entail,—we cannot think the test excessive.

The danger involved by the use of coarse cement is that of "blowing," as the coarse particles may not be acted upon by the water until the fine portions of the cement have set; the coarse particles, on uniting chemically with the water, expand and thereby damage the cement which has already set. The finer the cement is ground the less need is there for storing and air-slaking it before using.

It is, of course, possible to insist on such a degree of fineness that the cost of the cement will be increased out of proportion to the advantage gained, but this is a point which cannot be settled here. Mr. E. C. Clarke has stated that the difference in price between a cement of which 70 per cent. passed a sieve with 14,400 meshes to the square inch, and one of which 88 per cent. passed the same sieve, was 3s. 8d. per barrel, and "it was found to be much more economical to use the latter."

Tensile Strength.—The test for tensile strength is one of the most important which we have to consider, and in this, again, very different results may be obtained by different operators and with different apparatus. The temperature, the amount of water, the rate at which the strain is applied, all affect the result. The results vary also to the extent of 30 per cent. or more, according to the testing-machine used, and they are largely influenced by the form of the briquette, and of the clips by which it is held in the machine. Mr. E. A. Bernays, in 1880, gave to the Institution of Civil Engineers the results of tests he had made on four different forms of briquettes, all being of the same size at the neck or place where fracture would occur,—that is to say, 1½ in. by 1½ in. or 2½ square inches. Six briquettes of each form were made of "the same quality of cement," and tested at the end of seven days. The average tensile strength of briquettes of the



form A was 602 lbs., B 760 lbs., and C 900 lbs., the last, therefore, giving results 50 per cent. higher than the first, and nearly 20 per cent. higher than the second.

Form A is the form of briquette first used in testing cement, forms B and C are two of the many modifications which have been tried, and form D is the one introduced by Mr. John Grant, of the late Metropolitan Board of Works, and now generally adopted in England. Mr. Faija, however, has slightly altered the form by making each end of the briquette angular (like a gabled roof) instead of flat; this is done, not for the purpose of obtaining higher results, but for convenience in detach-

ing the moulds in which the briquettes are formed.

Several kinds of machines for ascertaining tensile strength are in use, but a detailed description of them would be out of place here. Among them we may mention those of Adie, Bailey, Michele, Frühling and Michailis, Quillot, Stadt, and Faija. They are nearly all adaptations of the lever, the stress in some being applied by means of a weight moving along a steeple; in others by pouring sand or water into a can at the end of the lever. In Stadt's machine the stress is applied directly by means of a screw, and the amount of the stress is measured by the compression of glycerine in a vessel into which the point of the screw moves. In Faija's machine the stress is applied by turning a small handle passing through a spring balance on which the amount of the stress can be read.

In ascertaining the strength of any cement, the average of not less than three tests ought to be taken. The usual age at which neat cement briquettes are tested is seven days, and very often another set of three or more is broken at the age of fourteen, and a third at the age of twenty-eight days. In some cases, three-days tests are taken, but tests at early dates are not always to be depended on, for it not unfrequently happens that one cement at the age of three and seven days gives better results than another, while at twenty-eight days the advantage rests with the latter; and very often a cement gives comparatively low results at three and seven days, but at the end of twenty-eight days shows such an increase of strength that it becomes quite safe to accept it for use. A cement which develops great strength in a short time may possibly (but not by any means necessarily, of course,) prove to be a dangerous one, liable to "blow" and disintegrate some time afterwards, owing to the presence of lime in excess. Instances are recorded of cements which show great tensile strength at the end of one month, but which fall to pieces at the end of six months.

There are in England no standard rules for the guidance of persons using cement, as there are in Germany and Austria. Here every engineer specifies the strength, fineness, &c. of the cement to be what his own sweet will directs; and, consequently, the varieties of specifications prove quite bewildering to manufacturers. Mr. William Gostling, with a touch of humour, drew attention to this matter by a communication printed in the *Proceedings of the Institution of Civil Engineers* (1879-80, part iv.). He gave three lists, which he had compiled, of specifications; twenty-one specifications showed thirteen different tests for fineness, ten for weight, and thirteen for tensile strength. The tensile strengths required by the specifications varied from 200 lbs. to 444 lbs. per square inch for neat cement broken seven days after gassing, and from 140 lbs. to 170 lbs. per square inch for briquettes made of cement and sand (1 to 3), broken at the age of twenty-eight days.

Mr. Grant, in the original specification of cement for the Metropolitan Main Drainage Works, required a tensile strength of 177.8 lbs. per square inch, but afterwards increased it to 350 lbs. Still more recently (namely, in 1880), he again raised the test, and required neat cement to bear at least 400 lbs. per square inch after seven days, and 550 or 600 lbs. after twenty-eight days, the briquettes in all cases being one day in air and the remainder in water. Mr. V. de Michele in 1880 considered a strength of 300 lbs. per square inch at seven days sufficient, while Mr. Faija follows Mr. Grant's middle test for the seven-days' strength, but specifies his requirements for tests at the age of three days and twenty-eight days, namely, 250 lbs. at three days, 350 lbs. at seven days, and 450 lbs. at twenty-eight days. Mr. A. E. Carey requires 180 lbs. at three days, 350 at seven days, and 550 at twenty-eight days for neat cement; and 120 lbs. at seven days and 200 at twenty-eight days, for briquettes of cement and normal quartz sand (1 to 3). Some manufacturers guarantee a strength of 444 lbs. per square inch at the age of seven days; Mr. G. F. White has stated that the average tensile strength of the cement made by his firm during a period of two years ranged from 502 lbs. to 524 lbs. per square inch. Cements have been tested which give a tensile strength of more than 700 lbs. at seven days, but such cements show little increase in strength afterwards, and as they most likely contain too much lime, are probably

somewhat dangerous. If a cement will bear 350 lbs. per square inch at the age of seven days, and is at the same time quite sound and sufficiently fine, it may be accepted for nearly all kinds of work.

The most usual size, in the smallest part of the briquettes made for ascertaining the tensile strength of cement, has been until recently, 1½ in. square, or 2½ square in., but there are now a great many persons who advocate and use briquettes measuring only 1 in. square in the smallest part, and such briquettes are certainly more convenient and can be tested with less powerful machines. Some persons even advocate the use of briquettes only ½ in. square.

GENERAL BUILDING NEWS.

RESTORATION OF OXWICH CHURCH.—The reopening services in connexion with Oxwich Church, Gower, have just been held. The church has been restored at a cost of 1,000l., the whole of which is defrayed by Miss Talbot, who is also laying out about 2,000l. in restoring Nicholson Church. The work was in progress at Oxwich, Messrs. Waller & Sons, Gloucester, and the builders Messrs. Bevan & Gibbs, Oxwich. The work was commenced twelve months ago, and has been completed to the satisfaction of everyone. There is, however, to be an addition to the wall above the chancel entrance. During the time that the work was in progress (the Rev. Mr. S. Jenkins) discovered two old windows, which have been opened up and restored. The church will accommodate upwards of 120 people, with considerably more at a crush.

EDINBURGH SCHOOL BUILDINGS.—Extensive works are at present in progress in connexion with various school buildings in Edinburgh. According to the *Edinburgh Evening Dispatch*, the School Board, from plans prepared by their Architect, Mr. R. Wilson, Queen-street, are making an addition to the south-west end of South Bridge School, to provide three class-rooms, the upper one to be set apart for teaching practical cookery. The alterations will cost about 1,000l. New practical cookery-rooms are also being constructed at Causewayside and Dean Schools, while other rooms are being turned into practical cookery-rooms at West Fountainbridge and Bristo Schools. At Lothian-road School the boys are getting an extra play-shed, and the same class of accommodation is in course of extension at Regent-place, where the St. Catherine's and Dean School Board, a janitor's house has just been completed at Gorgie, and their new school at South Morningside is expected to be opened on September 5. As usual, the Merchant Company are spending a good deal of money in adding to and altering their educational establishments. Extension and improvement in progress at James Watson's College for Boys (the plans for which were prepared by Messrs. MacGibbon & Ross, architects, Frederick-street). Regarding George-square Ladies' College, at the beginning of last session possession was taken of the large additions made to the east side of the institution. Since the college was closed about a year ago, the boys' workmen have been busy renewing the western portion of the building in the style of the existing new wing. As the operations, which will cost between 4,000l. and 5,000l., will not be completed till May next, temporary premises have been got in the immediate vicinity for carrying on the full work of the college in the interval. The alterations at James Gillespie's School, which had partly to be left over last year, are now being finished.

NEW BRICKWORKS, HEATH-TOWN, STAFFORDSHIRE.—The brickworks erected by the Midland Brick and Terra-cotta Company, at New-cross, Heath-town, were started on the 8th inst. Extensive machinery has been put down by the proprietors, Messrs. Dugmore & Son. The *Wolverhampton Express* says that the clay is prepared and then served direct to a perforated edge runner mill, which pulverises and thoroughly disintegrates it. By the same machine it is riddled, and by means of scrapers dispatched to an elevator, which takes the clay into a Johnson patent combination machine, whence it is fed into one of four moulds placed at right angles in a revolving cylinder 13 in. diameter. This cylinder remains stationary while the mould is being charged. The action of filling the mould automatically discharges the brick previously formed, thus avoiding any complicated motions for effecting the delivery. As the brick issues from the cylinder it falls into a convenient position where it is fed by a self-acting arrangement direct into the mould of the press. The pressed brick is then automatically raised out of the press mould and delivered to a suitable position for being loaded and taken direct to the

kiln. The output of the machine is from 12,000 to 15,000 per day, and the bricks produced, although made sufficiently hard to allow of being taken direct to the kiln, are entirely distinct from semi-dry bricks, being of that plastic character which, when burnt, exhibit all the density and closeness of grain peculiar to well-pressed plastic bricks. The plant has been put down by Mr. William Johnson, of Leeds, under the personal supervision of the junior partner (Mr. F. W. Dugmore). It is intended that the mound estimated to contain clay sufficient for over two hundred millions of bricks shall be worked up first.

CHACOWATER CHURCH.—The chancel stalls for Chacowater Church, Cornwall, have been entrusted to Messrs. Rashleigh, Pinwell, & Co., of Plymouth.

REGATE CONSTITUTIONAL CLUB.—This building, which is now being erected on the site of the old Crown Inn, is the *Survey Mirror* understands to be finished early in March next. The ground floor is to be occupied by the Capital and Counties' Banking Company, Limited, with the manager's room in the back portion of the building, and a strong room in the basement. On the upper floors, with a separate entrance and staircase, are to be the rooms for the club. These will consist of a general room on the first floor, occupying the whole front of the building, thus making a room 28 ft. 6 in. square, suitable for holding meetings, besides the ordinary use of a reading-room, &c., and on the second floor will be a billiard-room of the same size. At the back will be the committee and secretary's room. The club will be fitted up with lavatories and offices. The front elevation is designed in a free treatment of Renaissance, and is to be executed in red brick, with Bath stone carvings and features, excepting the base, which is to be in a bluish grey Forest of Dean stone. The front will be relieved by octagonal piers, and the central feature will be a gable with carved stone panels. The entrance doors, offices, and bank front will be executed in mahogany. The builder is Mr. Daniel Debenham, of Betchworth; and the stonework is being executed by Messrs. Pentold & Son, of Leshouers-road, Regiate, from the designs of Messrs. Heslth & Stokes, architects, London.

BUILDING IN BRISTOL.—The *Bristol Mercury* says that building operations are most energetically being carried on in the vicinity of Bristol, and the "march of bricks and mortar" north, east, south, and west is increasing. The activity in the building trade is most exceptional, and streets are springing up almost by magic. The northern and the eastern suburbs are especially remarkable in this respect, and what were once smiling fields and fertile gardens are being rapidly covered with villa residences and workmen's dwellings. Large tracts of land at Eastville and St. George are in the hands of the builders, and as quickly as the houses are erected they are equally as rapidly occupied. The population of "outer Bristol" is advancing by leaps and bounds, and a local Rip Van Winkle, awakening from his twenty years' sleep would not recognise the old suburbs of the ancient city.

SANITARY AND ENGINEERING NEWS.

SEWERAGE AND WATER SUPPLY, BLOCKLEY.—A special meeting of the Shipston-on-Stour Rural Sanitary Authority was held on the 13th inst. to consider the schemes for the sewerage, sewage disposal, and water supply of Blockley, which have been prepared by Mr. Wilcox, C.E., of Birmingham. A letter was read from Lady Northwick, in which she expressed her intention of contributing liberally towards the cost of the proposed undertakings. After some discussion, the schemes were unanimously approved, and Mr. Wilcox was instructed to proceed with the plans and estimates with a view of an immediate application to the Local Government Board to sanction a loan.

COMPULSORY SANITARY WORKS.—The *Lancet* says:—The Local Government Board are taking proceedings under Section 299 of the Public Health Act, 1875, to compel Worcester so to deal with its sewage as no longer to contaminate the river Severn. The city had been given a definite time in which to carry out the necessary works; nothing had been done in the matter, and now application has been made to the Court of Queen's Bench for a rule nisi for a mandamus to compel the Corporation to carry out the order of the Local Government Board. A similar rule was asked for against the Corporation of Rochester, but only months ago the Local Government Board, in the village of Boralst. Why this comparatively insignificant and outlying part of the city has been selected for the exercise of compulsory powers it is a little difficult to understand. We have shown what is the state of Rochester city, with its liquid filth soaking away into multitudinous cesspools, and the place has become notorious for its unattended default in regard to sewerage. The city as such is left out of Boralst alone is attacked. It may be that the lives of the prisoners and of those who are under Government control at Boralst are regarded as of special importance in Government circles; but the general public are hardly likely to look upon any such differentiation in the same light.

STAINED GLASS AND DECORATION.

THE MOSAICS IN ST. PAUL'S.—The *Daily News* says that in another month the mosaic work which for two years and more has been in progress upon the spandrels of the arches supporting the dome of St. Paul's will be "in proper language, finished. We say in popular language, and not necessarily in the estimation of the artist, Mr. W. E. F. Britten, under whose supervision the whole work has been executed, and by whom two of the eight pictures have been designed. In work of this description, minor defects,—perhaps defects of a more serious nature,—are pretty sure to be discovered after the mosaics have been placed, and when the removal of the scaffolding exposes them to view from the body of the church more than a hundred feet down below. This, indeed, has been the case with the St. Matthew mosaic, the original design of which by Mr. Watts, R.A., has undergone several changes. The St. Mark mosaic was put in position a week or two ago, and now the scaffolding has been removed to the empty spandrel which is to receive the last work of the series—namely, St. Luke."

THE HOTEL METROPOLITAN, BRIGHTON.—Messrs. Campbell Smith & Co. have just completed a very elaborate scheme of decoration at this hotel on the grand staircase, under the superintendence of Mr. Waterhouse, R.A., the architect of the building. The scheme of ornamentation is based on a free adaptation of Italian ornament, containing shells, dolphins, sea-weed, anemones, &c.

FOREIGN AND COLONIAL.

FRANCE.—The Salle Rade at the Louvre has been again opened to the public, having been enriched with a good many additional works of the eminent sculptor, especially the statue of Marshal Saxe and the monument to Napoleon I.—M. Louis Deschamps, a painter of merit, has been created Chevalier of the Legion of Honour.—M. Frémiot, the sculptor, after many months of preliminary studies, has now commenced the model for the monument to Raffet to be erected in the "Jardin de l'Infante" of the Louvre. The monument will consist of a bust placed on a column, at the foot of which is a figure of a French soldier of the Empire representing the military type of which Raffet was the illustrator.—In the presence of the epidemic diseases which are at present attributed to defects of the sewer system of Paris, the committee which was formed to erect a monument to the engineer, Durand-Claye, by whom the Paris drainage was laid out, has deferred its project, and will possibly decline altogether to carry it out.—A well-known goldsmith's firm have just completed a splendid reliquary intended to receive the "sainte tunique" in the church of Argenteuil. The reliquary is in chased copper, richly gilt, and decorated with precious stones, and with escutcheons of the Arms of France and of the ancient hishoprics of Argenteuil.—The Government has commissioned M. Froment Mazorolle, son of the well-known painter who died three years ago, to go to Spain to study the old French coinage preserved in the different museums of that country.—The French Alpine Club has had a chalet of refuge erected in the environs of La Grasse, (Hautes Alpes), at a height of 1,950 metres.—A monument has been inaugurated at Batilly to the memory of the French soldiers killed in 1870 in the combat of Sainte-Marie aux Chénes.—The railway company "du Midi" will shortly open a line between Bayonne and Saint Jean Pied-de-Port.—M. Magne, diocesan architect, has prepared a scheme for the restoration of the porch of the pretty little church of Nantilly, near Saumur, at a proposed cost of 60,000 francs.—A company of twenty American architects landed at Boulogne last week, purposing to make the tour of France on bicycles and tricycles.—M. Millet, sculptor of Marseille, has been commissioned to execute the statue of General Marbot.—There is again talk of building on the Tuileries site an immense Palace of Legislature, for Parliament and Ministerial departments. The building, which would be named "Palais de la Nation," ought, it is said, to be completed at the opening of the next Universal Exhibition in 1900.

A committee has been formed in the Communes of those departments of Seine and Seine-et-Oise which are down-stream in regard to Paris, to demand from the Government that the capital should be interdicted from turning any of its drainage into the river. These Communes are to form a syndicate to defend their common interests against the action of the city of Paris.

SCANDINAVIA.—The Board of Management of the Northern Museum, Stockholm, has submitted to the City Building Board the drawings for the new museum, the architect of which is Professor Claszon, and the Board is now engaged in inspecting the site for the new building. Estimates of construction for the new museum are now being prepared.—Herr G. Wickman, architect, has completed his design for the Swedish Exhibition Building at the Chicago Fair. It has been designed on the lines of the old Norse Stave churches, but it will be more solid. The building will be manufactured in Sweden and sent over in sections.—Good progress is being made with the interior

restoration of the ancient Castlo of Gripsholm, picturesquely situated in the sea near Stockholm, and at one time the residence of the Swedish kings. Nearly the entire work is being paid for by King Oscar. The architect is Herr F. Liljefekens.

According to the new building regulations of the City of Stockholm, underground or cellar residences are not permitted in new houses, and the regulations are being rigorously enforced.—In consequence of houses having been built of late years in Stockholm, the timber work of which in a short while has proved to be rotten, the Building Board applied to the municipal authorities for a sum of 1,500 kr. a year in order to appoint special surveyors of the timber used in construction. But the authorities have, whilst fully appreciating the value of the suggestion, been unable to make the grant.—A central electric station, capable of feeding 2,000 lamps, has been completed in the town of Helsingborg, and a similar one is to be built in the town of Christianstad.—The celebrated Swedish State Antiquarian, Professor H. Hildebrand, has again gone to the island of Gotland, in the Baltic, celebrated for its numerous ruins of Gothic churches. These, the Professor recently stated, are so numerous that in a journey of some 250 miles he had counted fifty-five. The architecture, finish, and ornamentation of these edifices he considers quite astonishing. The oldest church, Stanga, has an abscess, which is only the case with a few others. Some churches show considerable and curious modifications of the Gothic style. The Gothland churches are the handsomest in Sweden, which is greatly due to the material from which they are built,—viz, the excellent lime and sandstone found in the island. Nearly all the churches represent the Transition period between Gothic and Roman. A visit to the island, says Prof. Hildebrand, is instructive as well as interesting.—It is proposed to expend a sum of 12,000 kr. on the new Customs-house, to be built in Christiania during the current financial year.—The restoration of the Hankoushal, in Bergen, is now nearly completed. It is a building in Gothic style, of great historical interest, having at one period been the residence of Norse kings, which modern vandals turned into a warehouse!—A huge monument in bronze is to be erected at Christiania of "Nordenskjöld," "Norway's Nelson," with the execution of which a promising young sculptor, Herr Axel Ender, has been entrusted. He will finish the figure in Paris.—Copenhagen is also to have its Eiffel Tower, and a company has been formed for the realisation of the project. It will be similar in shape and construction to the Parisian tower, but 1,640 ft. in height. It will afford a fine view of Copenhagen and the Sound.

MISCELLANEOUS.

SOMERSETSHIRE ARCHEOLOGICAL SOCIETY.—The forty-fourth annual meeting of the members of the Somersetshire Archeological and Natural History Society was held at the Town-hall, Wellington, last week, and was attended by a large number of members from all parts of the country. The local committee had provided an interesting museum for the occasion, many objects of archeological value and specimens of natural history being arranged at the end of the large building at the Town-hall, under the direction of Mr. Bidgood, the Curator of the Society's Museum at Taunton. Among some of the interesting exhibits were the result of the investigations being carried on near Glastonbury, and Mr. W. A. Sanford's (the President-elect) collection of flint implements and bronzes, pottery, many interesting manuscript books, and a book called "A Collection of Poems by W. Shakespeare." At the business meeting, Colonel A. R. Hoskins (the retiring President) moved that the President-elect (Mr. W. A. Sanford) take the chair. This was unanimously agreed to. The President-elect having taken the chair, the report of the Council was read by Lieut. Colonel J. R. Bramble, F.S.A., one of the honorary general secretaries. It congratulated the members on the continued progress made by the Society. The report was adopted. After the President's address had been delivered, the party visited Wellington Church, and afterwards drove to the Poole brick works, which were thrown open to inspection by the kind permission of the directors; then on to Bradford Church, West Buckland Church, and Gerhestone House. The party retraced in the evening to Wellington. In the evening a meeting of the Society was held at the Town-hall, when several papers were read. On the following day an excursion was made to Barlescombe Church, the principal features in which were pointed out by Mr. Edmund Buckle. The visitors then went to the well-known Westleigh Limestone Quarries, where addresses were given by Professor Roy Dawkins and Mr. Ussher. Thence the party went to Canonleigh to see the remains of the abbey founded for canons of the Augustinian order, and subsequently occupied by canonsess of the same order. A paper on "Canonleigh Abbey" was read by the Rev. T. C. Tanner, vicar of Barlescombe. After luncheon a visit was paid to Holcombe Rogus church. Mr. Buckle gave an address on some of the points of interest; and Mr. Summers gave in

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, and Tenders to be delivered. Includes entries for wood paving works, alterations to Finchley Rectory, drainage and roadmaking works, etc.

CONTRACTS.—Continued.

Continuation of the Contracts table, listing items like Cemetery Chapels, Restoration of London House, Walthamstow Workhouses, etc.

PUBLIC APPOINTMENTS.

Table with 3 columns: Nature of Appointment, By whom Advertised, Salary. Lists positions such as Surveyor, Clerk of Works, and Temporary Assistant Clerk of Works.

Those marked with an Asterisk (*) are advertised in this Number. Contracts, pp. 1v, vi, & viii. Public Appointments, p. xviii.

formation concerning the fine monumental edifices of members of the Bluet family. The other places visited were Greenham Barton Manor-house, in the parish of Ashbrittle, and Cotchay Manor-house, Kibblesford, in the evening the Board had a meeting in the Town-hall, at which papers were read.

THE BRITISH OUTPUT OF PIG-IRON.—The statistics just published by the British Iron Trade Association of the production of pig-iron in Great Britain during the first six months of the current year exhibit a very heavy falling-off. The total output up to the end of June was only 2,700,918 tons, against 3,712,337 tons to June 30, 1891. The decrease was consequently 921,469 tons, or almost 25 per cent. The chief cause of this decline was undoubtedly the three months' stoppage of fuel supply through the Durham miners' strike, and the principal sufferer was the Cleveland district, the production in which fell by 719,244 tons, or 54 per cent., the output in 1891 being 1,320,083 tons, and only 600,839 tons this year. Cumberland reduced her output by 119,304 tons, or nearly 35 per cent., from 342,051 tons in 1891 to 222,747 tons in 1892, owing to her supply of coke from the ovens of Durham being cut off for three months. The pig-iron production of Lancashire declined from 544,211 tons in 1891 to 250,505 tons in 1892, or by 107,778 tons (over 31 per cent.). The only iron-producing district which appears to have profited by the Durham strike was Scotland, whose estimated output rose from 392,600 tons in 1891 to 466,000 tons in 1892, or by 73,400 tons (18.7 per cent.). Cleveland pig-iron having been largely replaced by Scotch pig. The number of furnaces in blast in Great Britain on June 30, 1892, was 316, out of 730 existing furnaces, against 388 out of 738 in blast on June 30, 1891. Owing to the stoppage of the furnaces for three months during the past half-year, stocks of pig-iron have been greatly reduced, which accounts for the present firmness of the English iron market, notwithstanding a moderate demand. While on June 30, 1891, the stocks of pig-iron in Great Britain were 1,285,572 tons, at the corresponding date this year they amounted to only 700,450 tons. This shows a decrease in stocks of 595,122 tons, or close upon 46 per cent.

AN EXETER BUSINESS.—An Exeter evening paper refers to the firm of Messrs. J. Easton & Son, quarrymen, stone merchants, and masons, who have carried on a business established more than half a century. Having outgrown the accommodation provided in the old premises, Northernhay-street, the firm has acquired property adjoining, which extends up the street as far as Maddock's-row. On this site, under the shadow of the old city wall, long ranges of sheds and workshops have been built, and the ground levelled. Entrance to the new premises is obtained through a wide gateway supported on either side by massive Doric columns. Within may be seen a numerous staff busy on monumental and other stone and marble work. The shops are furnished with the newest machinery and labour-saving appliances, worked by steam and hand power.

THE PROPOSED NEW FEVER HOSPITAL FOR LONDON.—The proposal of the Metropolitan Asylums Board to establish a fever hospital on a site near St. Anne's-road, Tottenham, has excited the keenest opposition on the part of the surrounding inhabitants, individually, collectively, and in their several corporate capacities. The Local Government Board have, however, given their consent to the scheme, after receiving a report from Dr. Bridges and Mr. Hadley. The consent is subject to the following conditions:—(a) That no buildings for the reception of patients shall be erected except on such land as the Board may desire to be used for that purpose; and (b) that the land and buildings shall, during the twelve months next following the date of the order, be used for the reception of patients suffering from fever, and of no other patients, and at the expiration of that term shall cease to be used for the reception of patients unless the Board, by order, otherwise

direct. Both the inhabitants of the district in question and the managers of the Asylums Board are placed in a very difficult position. No neighbourhood cares to have close at hand a great fever institution, especially in view of the benefits of a population other than its own. But the Metropolitan Asylums Board have a statutory duty to perform, and they have an emergency to face which the Government and the metropolis expect them to meet by some appropriate action; and when the question of the several specific fevers, and especially of the typhoid fever, is concerned, they have the authority of abundant experience to show that in the case of hospitals situated in densely-populated parts of London no spread of disease and no cause of ill-health result to the surrounding community if the hospital is properly administered. We cannot, therefore, blame them for their insistence on securing the site in question; neither is there any aspect of public health as to which they could have been expected to hesitate in the action they have taken. But, so far as the neighbourhood of the hospital is concerned, we fear that the limitation of the order of the Board to one year will have but little meaning. A site once devoted to such a purpose will probably acquire a vested right to be retained for similar purposes, and, in face of the necessity of additional means of isolation for the metropolis, the prospect of an abandonment of this site after the expiration of any definite term of months is not a hopeful one for the locality.—Lancet.

CROWLAND ABBEY.—The Morning Post and other journals have given currency to a paragraph stating that the work of restoring the historical Abbey of Crowland, Lincolnshire, which has been in hand for the past few years, will now, it is feared, come to a standstill owing to want of funds. Although much has been done to preserve the fabric, there are yet many important parts which remain untouched, and which must inevitably perish if not soon restored. Amongst these is the Early English doorway in the west front. The tracery in the spandrels of the arch is crumbling away, as is also the carving representing the legendary life of Guthlac in the quoitfoil; whilst by acts of vandalism on the part of visitors the marble columns flanking the doorway are being injured, and in some cases broken away bit by bit.

THE AMERICAN PRODUCTION OF BESSEMER STEEL.—The output of Bessemer steel ingots in the United States during the first six months of this year, as we learn from the statistics issued by the American Iron and Steel Association, amounted to 2,395,998 net tons (of 2,900 lb.), against 1,595,096 tons in the corresponding six months of 1891, and 2,038,011 tons in the second half of last year. The increase over the output of the first six months of 1891 was consequently 796,903 tons, or over 44 per cent., and over that of the last six months of 1891 only 267,988 tons, or over 13 per cent. The production of steel rails in the first half of the current year was 395,123 net tons, against 374,000 tons in the first, and 756,330 tons in the second, half of 1891. The increase in the first six months of 1892 was consequently 255,190 tons, or nearly 50 per cent., over the first, and 78,798 tons, or 10 per cent., over the second, half-year's output.

MENDING LONDON BRIDGE.—On Monday operations for the repair of London Bridge were commenced, and are expected to extend over a fortnight. However quickly and well the work may be done, much public inconvenience will be caused, for, as the City Press reminds us, the day census of the City showed that no less than 107,000 persons and over 14,000 vehicles cross the bridge in four-and-twenty hours. The London Corporation will bring into greater prominence the need of the London Bridge, which may be dimly seen raising its towers amid the haze and smoke of the river. That the County Council fully recognise the importance of the new artery is evidenced in the fact that before adjourning they agreed to an expenditure of £423,000 for the southern approach road. But this was only passed on a condition which will prove to

Londoners how much they are individually interested in the work of the new Parliament. The stipulation was "that if the principle of the equitable division of the cost be refused, the scheme be not proceeded with."

ROYAL VICTORIA HALL, WATERLOO-ROAD, S.E.—It is announced that the popular science lectures will be resumed on Tuesday evenings during September. The first three lectures will be given by Professor B. J. Mairden, and will be as follows:—On the 31st, "The Wonders of the World"; 13th, "A Holiday in Sweden and Denmark"; 20th, "Australia." On September 27 a lecture will be given by the Rev. A. H. Glukes on "Shakespeare."

CAPITAL AND LABOUR.

BRICKLAYERS' STRIKE IN LONDON SUBURBS.—The Standard says that several of the master builders affected by the strike of bricklayers in Kingston, Surbiton, Twickenham, and the adjacent districts, have conceded the increased wages demanded by the men, and agreed to at the Building Trades' Conference in June. The Mayor of Kingston, who is a large employer, was the first to accept the new working rules, and his action was speedily followed by a number of other builders. The dispute at Hounslow is not yet settled; and at Bromley, which was on Tuesday visited by Mr. Alderman Taylor, L.C.C., Secretary of the Central Strike Committee, the position is unchanged, none of the men having returned to work, and an attempt to import free labour having proved unsuccessful. Meetings of the men on strike were held on Tuesday, and resolutions pledging them to continue the struggle were unanimously carried.

MEETINGS.

SATURDAY, AUGUST 27. British Archaeological Association.—Annual Congress, Cardiff (concluded). Glasgow Architectural Association.—Visit to Dunblane Cathedral.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

15,291.—CHIMNEY-POTS: W. J. Lawrence.—This invention relates to a method for preventing down-draught in chimneys without in any way interfering with the free egress of the smoke or the sweeping of the chimney. This is effected by means of a fan and a side outlet. The outlet is made in the side of the pot, a short distance from the top. The fan is made of a suitable metal fixed on a spindle, which goes through the pot at the top of the side outlet, and the fan projects a short distance from the pot, and has wind-gears fixed on the top to catch all side winds. It is so placed that the wind coming towards it would cause the outside of the fan to drop and the inside to rise, thereby closing the straight flue, and allowing the smoke to pass by the side outlet.

15,470.—ROOFS: H. Lawrence.—The main object of this invention is to provide strong, light, and durable roofs suitable for conservatories, exhibition buildings, winter gardens, and the like. They are so constructed as to be readily erected, and afterwards removed and re-erected at pleasure. The roofs should be preferably of semi-spherical or semi-elliptical form. The inventor first provides upon the wall a continuous horizontal platform of any desired width, formed probably of steel or riveted thereto. The roof is constructed of a number of intersecting curved and zone girders, riveted or bolted to each other where intersecting, and the manner of fluting and making is fully set out in the specification. The roof may be covered with any suitable material.

15,471.—WINDOW-FRAMES: J. Barlow.—This specification refers to a window-frame constructed in such a manner as to enable any person to remove the sashes from the interior of a room for cleaning, repainting, or other purpose, and to replace them without the use of tools, steps, or outside ladders. It excludes draught, and prevents rattling. It consists of a sill, headpiece, in-

side and outside linings, and removable pulley-ties (without pockets, parting, or inside border beads)...

u.t. 82 yrs, g.r. 352. 10s., 1,600l.; 97, Dartmouth-rd., Forest-hill, u.t. 60 yrs, g.r. 27. 10s., r. 352, 350l., 30, 32, and 34, Rowland-gr., Sydenham, u.t. 74 yrs, g.r. 157, r. 302l., 31 to 34, Smith's cottages, u.t. 59 yrs, g.r. 61, r. 52s., 230l.; 29 to 39 (odd), Procter-st., u.t. 74 yrs, g.r. 142, r. 120l. 8s., 60s.; 27 and 29, Coombe-rd., u.t. 70 yrs, g.r. 82, r. 42s. 10s., 290l.; 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 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2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 3007, 3009, 3011, 3013, 3015, 3017, 3019, 3021, 3023, 3025, 3027, 3029, 3031, 3033, 3035, 3037, 3039, 3041, 3043, 3045, 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3379, 3381, 3383, 3385, 3387, 3389, 3391, 3393, 3395, 3397, 3399, 3401, 3403, 3405, 3407, 3409, 3411, 3413, 3415, 3417, 3419, 3421, 3423, 3425, 3427, 3429, 3431, 3433, 3435, 3437, 3439, 3441, 3443, 3445, 3447, 3449, 3451, 3453, 3455, 3457, 3459, 3461, 3463, 3465, 3467, 3469, 3471, 3473, 3475, 3477, 3479, 3481, 3483, 3485, 3487, 3489, 3491, 3493, 3495, 3497, 3499, 3501, 3503, 3505, 3507, 3509, 3511, 3513, 3515, 3517, 3519, 3521, 3523, 3525, 3527, 3529, 3531, 3533, 3535, 3537, 3539, 3541, 3543, 3545, 3547, 3549, 3551, 3553, 3555, 3557, 3559, 3561, 3563, 3565, 3567, 3569, 3571, 3573, 3575, 3577, 3579, 3581, 3583, 3585, 3587, 3589, 3591, 3593, 3595, 3597, 3599, 3601, 3603, 3605, 3607, 3609, 3611, 3613, 3615, 3617, 3619, 3621, 3623, 3625, 3627, 3629, 3631, 3633, 3635, 3637, 3639, 3641, 3643, 3645, 3647, 3649, 3651, 3653, 3655, 3657, 3659, 3661, 3663, 3665, 3667, 3669, 3671, 3673, 3675, 3677, 3679, 3681, 3683, 3685, 3687, 3689, 3691, 3693, 3695, 3697, 3699, 3701, 3703, 3705, 3707, 3709, 3711, 3713, 3715, 3717, 3719, 3721, 3723, 3725, 3727, 3729, 3731, 3733, 3735, 3737, 3739, 3741, 3743, 3745, 3747, 3749, 3751, 3753, 3755, 3757, 3759, 3761, 3763, 3765, 3767, 3769, 3771, 3773, 3775, 3777, 3779, 3781, 3783, 3785, 3787, 3789, 3791, 3793, 3795, 3797, 3799, 3801, 3803, 3805, 3807, 3809, 3811, 3813, 3815, 3817, 3819, 3821, 3823, 3825, 3827, 3829, 3831, 3833, 3835, 3837, 3839, 3841, 3843, 3845, 3847, 3849, 3851, 3853, 3855, 3857, 3859, 3861, 3863, 3865, 3867, 3869, 3871, 3873, 3875, 3877, 3879, 3881, 3883, 3885, 3887, 3889, 3891, 3893, 3895, 3897, 3899, 3901, 3903, 3905, 3907, 3909, 3911, 3913, 3915, 3917, 3919, 3921, 3923, 3925, 3927, 3929, 3931, 3933, 3935, 3937, 3939, 3941, 3943, 3945, 3947, 3949, 3951, 3953, 3955, 3957, 3959, 3961, 3963, 3965, 3967, 3969, 3971, 3973, 3975, 3977, 3979, 3981, 3983, 3985, 3987, 3989, 3991, 3993, 3995, 3997, 3999, 4001, 4003, 4005, 4007, 4009, 4011, 4013, 4015, 4017, 4019, 4021, 4023, 4025, 4027, 4029, 4031, 4033, 4035, 4037, 4039, 4041, 4043, 4045, 4047, 4049, 4051, 4053, 4055, 4057, 4059, 4061, 4063, 4065, 4067, 4069, 4071, 4073, 4075, 4077, 4079, 4081, 4083, 4085, 4087, 4089, 4091, 4093, 4095, 4097, 4099, 4101, 4103, 4105, 4107, 4109, 4111, 4113, 4115, 4117, 4119, 4121, 4123, 4125, 4127, 4129, 4131, 4133, 4135, 4137, 4139, 4141, 4143, 4145, 4147, 4149, 4151, 4153, 4155, 4157, 4159,

LONDON.—Accepted for building new refreshment rooms, &c., at London Bridge Station, for the London, Brighton, and South Coast Railway Co. Mr. F. D. Haister, engineer. Quantities supplied by Mr. C. H. Gough:—
J. O. Richardson, Albert Works, Peckham £1,735 0 0

LONDON.—For repairs to Wesleyan chapel, Liverpool-road, N. Mr. P. Boreham, architect, 75, Pinner-street. No quantities:—
S. Lawrence & Sons £703 0
Williams & Son £710 0
Dove Bros. £747 0
Cheesum & Son £821 0
Clarke & Boney £718 0
C. W. Matthews £81 0

LONDON.—For alterations to premises at Union-road, Rotherhithe, S. E., 1st Messrs. Houghton, Messrs. Snook, Page, & Stock, architects:—
Pritchard & Reuwick £700
Chafen £688
Wells £291
G. O. Richardson £98
White £67
Oldman £49

LONDON.—For fire fittings, &c., at the "Baymouth Arms," Baymouth-road, Hornsey, for Mr. John Baker, Mr. James Warr, architect, 1, Montpelier-road, Peckham:—
Taylor & Sons £335
P. H. Hopkins, 103, Cramp, Elvans & Midway £301
Gou Street, &c. £292
* Accepted.

LONDON.—For alterations at 10, Selley-place, Oxford-street, W., for Captain Brantley, Mr. Robert Bell, architect, Great Marlborough-street, W.:—
Myring & Co. £220
Hilder & Edge, 17, Bride Court £181
Lane, Golden-square £180
* Accepted.

LONDON.—Accepted for works of renovation and decoration to the Lecture Hall, Amey Congregational Church, Stoke Newington, for Mr. Ed. Whitson, architect, 41, Notcutt-road, Stoke Newington:—
Brown, Henry £187.

MAIDSTONE.—For paving certain footways (5,000 yards super) in the Borough of Maidstone. Mr. W. G. Sissons, C.E., Borough Engineer and Surveyor:—
In situ Portland Cement Concrete Paving.

Table with 2 columns: Contractor Name and Amount. Includes Jones' Annelaid Concrete Co., Bowstone & Co., Nettleton & Co., Patent Portland Stone Co., Imperial Stone Co., Patent Paving and Construction Co., Situat's Granolithic Co., Hayes Bros., McFarlane, Walker, Eliott's Patent Stone Co., Patent Indurated Stone Co., Tar Paving, A. C. Heston & Co., Beutend & Son.

MIDDLESEX (near Halifax).—Accepted for works in the erection of a new farmhouse called "Holly House," Barn, Muntal, for eleven head of cattle, stable, and outbuildings. Mr. R. L. Pattey, architect, Halifax:—
Eaton, Peter, Mason, and Bricklayer—Joseph Gawroger, W. Riley, near Halifax £198 0 0
Plumber and Glazier—Wm. Alderson, London 14 0 0
Rifer and Plasterer—Thomas Alderson, London 24 0 0
Landscape 2 0 0
* Materials for out-walls and ground flooring, which are entirely of stone, provided by pro-jector. Carpenters and joiners' work, and site, provided by proprietor.

FIREBRICK (Surrey).—For erecting a small house, Firebrick, Surrey, for Mrs. Lovelock. Mr. A. J. Stanger, architect and surveyor, Kullford:—
John Faggetter £247 0
James Faggetter £203 12
Stanley Ellis £320 0
C. Thompson (accepted) £290 0

RAINHAM (Essex).—For rebuilding the "Bell" Hotel, Rainham, Essex, for Messrs. Ind. Couper & Co. (Limited), Romford, Essex. Messrs. Wig, Oliver, & Hudson, architects, 7, Bedford-row, W.C., and 80, Leaman-street, E. Quantities by Messrs. Goodman & Simpson:—
W. Watson £2,113
J. S. Hammond & Son £1,898
J. Bentley £,971
Bosang & Davis (accepted) £,790

READING.—For erecting new School Board offices. Messrs. C. Smith & Son, architects:—
W. Jackson £6,592
T. Kingletts £4,907
Higgs & Hill £,484
Bottrell & Son £,720
Hockingham & Son £,719
Watson £,130
Bisby & Bins £,929
Huggins £,573
Crock & Son £,800
Higgs & Son £,600
Flitton, Reading £,353
* Accepted.

SOUTH SHIELDS.—For the extension of the offices of the School Board. Mr. J. Walter Hanson, architect, 78, King-street, South Shields. Quantities by the architect:—
H. Brown & Co. £1,283
R. Goodwin & Son £1,311
John Moore £,274
W. J. Robertson £,244
Wm. Wilson £,305
South Shields £,394
John Miller £,238
J. C. Robinson £,153
Jas. Young £,223
* Accepted.

WAKEFIELD.—Accepted for the erection of Work Arley and Stanley Drainage Works, for the Rural Sanitary Authority. Mr. Frank Massie, engineer, Tetley House, Wakefield:—
Contract No. 2 (first instalment):—
Townsend & Watson, Sheffield £598 13 0
Contract No. 3 (first instalment):—
T. & G. Wilson, Wakefield £4,337 8
Contract No. 3 (second instalment):—
T. & G. Wilson, Wakefield £239 8 4

WYMOUTH.—For additions to flour mills, for Messrs. Swafford & Co. Mr. S. Jackson, architect, Quantities by the architect:—
Foot £48 0
Whitlam £250 0
Clarke £13 0
Bartlett £91 0
Ince £34 10
Brown Bros. (accepted) £33 0
[All of Weymouth.]

WINCHESTER.—For alterations and additions to Hants County Police Head Quarters, Winchester. Mr. W. Robinson, architect:—
Southers £1,947
Fielder & Son £1,670
Crick & Son £,089
Cross, Southsea (accepted) £,030
Burkington & Son £,088

WINCHESTER.—For the erection of small public hall and addition to the G. Hall, for the Corporation of the City of Winchester. Mr. J. R. Colson, architect:—
Lascelles & Co. £5,740
Lish & Co. £5,095
J. H. Cowie £,490
E. Buckingham & Son £,560
H. Saunders £,342
John Cook & Son, South-Fielder & Son £,230
Morgan & Co. £,138

WOOLWICH.—For the erection of premises at High-street, Woolwich, for Mr. J. Gabriel, Mr. J. O. Cook, architect. No quantities supplied:—
Proctor £250
Brown & Son £725
Starbrough & Kimber £50
J. O. Richardson £92
Fulman £47
Harris £65

WOOLWICH.—Accepted for additions to house, King-street, for Mr. Thosgood. Mr. Walter Whitson, architect, Stoke Newington:—
Cuddington, J. W., Woolwich £238.

WORKSOP (Notts).—For erecting house, Hawk's Nest Farm, Worksop Manor Estate, for Mr. John Bellinson. Mr. W. H. Higginbottom, architect, 7, King John's-chambers, Nottingham. Quantities by the architect:—
R. H. Rawson £290 0 0
C. Hilt & Son £49 0 0
J. Holt & Son £71 0 0
Herring & Jew £44 18 0
Enoch Head £67 0 0
Geo. Sailer, Nottingham £28 13 0
H. Vickers £63 0 0
Harris & Jew £29 18 0
J. F. Price £19 0 0
* Accepted.

WORKSOP (Notts).—For erecting farm stable, sheds, &c., Drunken Pits, Worksop Manor Estate, for Mr. John Bellinson. Mr. W. H. Higginbottom, architect, 7, King John's-chambers, Nottingham. Quantities by the architect:—
R. H. Rawson £290 0 0
C. Hilt & Son £49 0 0
J. Holt & Son £71 0 0
Herring & Jew £44 18 0
Enoch Head £67 0 0
Geo. Sailer, Nottingham £28 13 0
H. Vickers £63 0 0
Harris & Jew £29 18 0
J. F. Price £19 0 0
* Accepted.

WORKSOP (Notts).—For erecting horse, Hawk's Nest Farm, Worksop Manor Estate, for Mr. John Bellinson. Mr. W. H. Higginbottom, architect, 7, King John's-chambers, Nottingham. Quantities by the architect:—
R. H. Rawson £290 0 0
C. Hilt & Son £49 0 0
J. Holt & Son £71 0 0
Herring & Jew £44 18 0
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WORKSOP (Notts).—For erecting horse, Hawk's Nest

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History of Art in Persia.



Noticing last month the work by MM. Perrot and Chipiez on the art of Phrygia, Lycia, &c. we referred in passing to their volume on Persian art,* which forms the next and most recent one of the series, and the English translation of which has been issued simultaneously with that of the volume on Phrygia. Considering that the ostensible purpose of the authors has been to trace the stages of development of the forms of Greek architecture, with the intention of leading up to a full treatment of that great subject, it may be questioned whether Persia is not rather a "step aside from the direct forthright;" and indeed the authors seem to think some degree of apology necessary for not proceeding direct to Greece from their previous volume. The excuse is that if Persia had been left, as it were, unconquered in the rear, some return to it would have been necessary when dealing with complete Greek art, to trace the degree of connexion between that and some features of Persian art; that Persia exhibits the latest development of ancient Oriental art, partially influenced by the rising art of Greece, and that therefore its proper place in the series is here. "Henceforward," they add at the close, "our path is clear, and nothing more interposes between us and Greece, upon which our eyes have ever been fixed, as towards a longed-for goal and land of promise, even when we seemed to wander farthest away from it, and lose sight of its shores amidst the many curves and windings of the way." Certainly the connexion of Persian with Greek art is far less direct and obvious than in the case of Lycian art, and it may even be questioned whether some part of the supposed influence of Persia on Greece, accepted by previous writers on architecture, must not be given up; but the digression is at all events an

interesting one, and has given the authors occasion for some studies in restoration which are at least clever and brilliant if not convincing.

The curious problem presented by the remains of Persian architecture of the antique period is, as the authors observe, how to account for an architecture of which columns, doorways, and windows are the sole relics?—The roofs of course we may at once conclude to have been timber, but the matter of the walls is not so easy to deal with. The general view of the platform at Persepolis, with its widely scattered columns and other remains of buildings, is not more fragmentary certainly than the view of the Roman Forum; but taking the view of the remains of the Palace of Darius (fig. 1, see next page) as given by our authors, there is something quite abnormal in this collection of built-up door and window architraves from between which all the connecting walls have disappeared. If the walls were built in large blocks like the door and window architraves, how is it that fragments equal in size to those of the door and window erections have not been found? All that we find between the openings, say the authors, is a kind of foundation of squared stones of never more than two or three courses, "the plinth of a wall that has vanished. Had its composition been akin to that of the substructures, some of its remains, like the splintered shafts and capitals, would be seen around the palaces." The conclusion suggested by the authors is that the interspaces of walling were built up with crude unburned bricks, which would be easily broken down when once the building was deserted, and which in any case centuries of rain and weathering would have disintegrated. In support of this theory they appeal to the fact that M. Dieulafoy found "the mighty ramparts" which surrounded the palaces at Susa entirely built of crude brick. If it seems rather illogical to adduce the presence of existing remains of crude brick at one place to explain the disappearance of all similar remains at another place, the answer may perhaps be that the masses of brick at Susa were too large to be entirely destroyed by time or violence, like the small connecting walls at Persepolis. At all events, there is the

problem in the shape of the existing character and position of the masonry remains, and can any better solution be suggested? The reason for this curiously hybrid construction may perhaps be found in the fact that every Persian monarch was desirous of building and living in his own palace, and therefore adopted the method of building which would lead to the quickest result, confining the finished masonry to the salient portions of the architecture, and filling in the remainder expeditiously and cheaply, facing the crude brickwork with enamelled tiles.

The characteristic column and capital of Persian architecture (fig. 2) is one of the most curious and complicated features of the kind, one of the most unsatisfactory jumbles of good and bad design, which the whole history of architecture has to show. The base is a good piece of design, except that in this example the decoration is hardly sufficiently distinct in effect from the fluting of the column above; this, however, is not always the case, some of the examples showing a much more marked and individual decoration of the base. The upper portion of the column shows a conglomeration of features having nothing in common and no structural relation to one another, a matter of great importance in the case of so specially structural a feature as a column. The inverted bell-and-flower capital which is placed directly on the shaft is a very graceful detail in itself, and would even make a suitable enough capital for a light superstructure. The double hull-head bracket which forms the upper member is also a fine piece of design and very well suited as a decorative bearing for a timber superstructure, but it is utterly out of keeping with the bell-and-flower feature below, while the scrolls placed vertically between the two are out of keeping with both, and form a detail completely misplaced, having no structural connexion with what is above or below them, and forming a weak feature exactly where constructive strength is most required. Had the Persian architects placed the hull-head bracket immediately on the top of the shaft, with a moulding interposed to form a seat for it, they would have deserved the credit of having invented an original and artistic feature; as it is, they produced a tasteless jumble of

* History of Art in Persia. From the French of M. Perrot and Charles Chipiez. London: Chapman & Co. New York: A. C. Armstrong & Son. 1892.



Fig. 1.—Remains of Palace of Darius at Persepolis.

details all elegant in themselves, but utterly spoiled by the manner in which they were combined. Some recent writers on architecture have been betrayed into bestowing most unmerited praise on this Persian column, apparently merely because it is a piquant variation from the Classic column, which they are tired of praising; MM. Perrot and Chipiez,

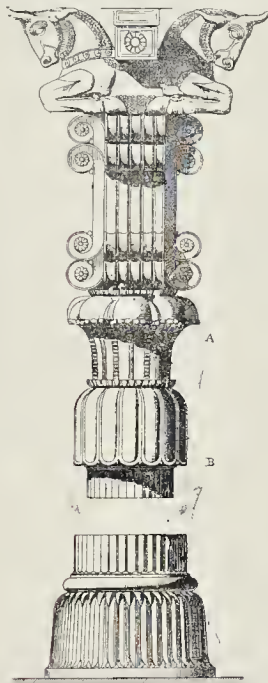


Fig. 2.—Base and Capital, Persepolis.

we are glad to observe, show more critical discernment, and are fully alive to the æsthetic defects of this feature, while they take great trouble in illustrating it. As to the origin of this curious combination it seems hardly likely that we shall ever get at any decisive facts. As to the bracket form of the capital, spreading out laterally on each side of the column, the authors join with M.

Dieulafoy in thinking that the modern peasant's house as represented in fig. 3 is the ancient form of rural Persian habitation preserved nearly unaltered to the present day, and that here we have the origin of this bracket form of capital in its rudest and unworked state.* We fear we must retain our attitude of scepticism as to these rural types which we now meet with in almost every French hook on the history of architecture, and which seem to come in so opportunely and to be so exactly suited to the historian's requirements. This illustration is taken from MM. Perrot and Chipiez's hook, who take it from M. Dieulafoy's book; and through how many hands has it passed between the actual existing hut and the engraving on M. Dieulafoy's pages? Did M. Dieulafoy see it, just as represented here, with his own eyes? We very much question it, and we must say that we have been impressed over and over again, of late years, by the remarkable faculty of French archaeologists for seeing things which are favourable to their own theories. Viollet-le-Duc had a great deal too much of this kind of archaeological second-sight; we find it in Lesueur's brilliant work on Classic architecture, we noticed it the other day in MM. Garnier and Ammann's hook on the "History of the Habitation"; we seem to see it here again. Peasants' huts showing the *origines* of the architecture of a country have the most remarkable knack of turning up in French historical hooks on architecture. Such indications are of the highest interest where they do exist, but we should rather like to see direct reproductions from photographs of the original structures, instead of neatly made-out engravings in which we have no means of tracing the relation to the original structure, or even to the original sketch of it.

In regard to one other point in the Persian capital, the vertical volute, the authors make no remark as to the possible connexion be-

* The argument of the authors that "the beam is more apt to give way under the burden of the roof than would a stone of the same dimensions," and that the bracket shape is therefore used to reduce the bearing, is a very odd one, if it means (as the words seem to imply) that a timber beam will not take so long a bearing as a stone one.

tween that and the volute of the Ionic capital, and we may bazard the opinion that if there is any such connexion, it is in the contrary direction to that suggested by Pergusson, who assumed that in this Persian capital we had the origin of the Ionic volute. But the volute in its proper horizontal position had occurred long before this in Lycian monuments, and in reality the volute set up on end is such a radically different idea from the volute set horizontally that there is really no need to imagine a connexion between one and the other. But if there is any connexion, the probability is that it was the Persians who clumsily misused the Lycian and early Greek form.

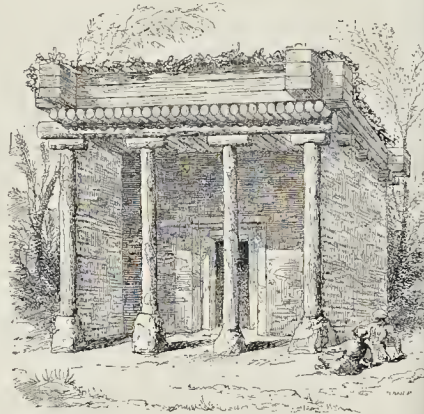


Fig. 3.—Modern Peasant's House, Macanderan.

There is a good deal of imagination also, though doubtless of a very ingenious nature, in the elaborate restorations of the wooden roofs of the Persian palaces given by M. Chipiez. "We are able," say the authors, "to restore them from the notches they have left at the summit of the ante and pilasters both at Pasargade and Persepolis." The exact extent of the authority given for the restoration is shown in figs. 4, 5, 6, and one of the smaller "restorations" (by M. Chipiez) is shown in fig. 7. It will be admitted that this is a good deal of timber detail to evolve out of the notches in two square stone columns, and a rude representation of the front elevation in a rock-cut copy. That the notches in the stone columns do indicate where timber has been framed into them there can be little

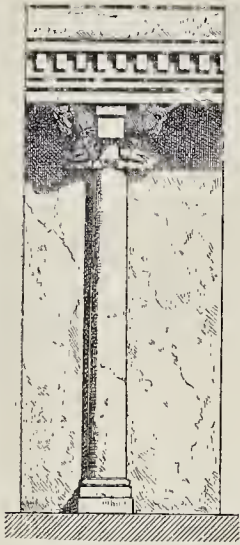


Fig. 4.—Part Elevation of Rock-cut Tomb, Naksh-e-Rustem.



Fig. 5.—Detail of Upper Part of Stone Pillar, Persepolis.



Fig. 6.—Pillar, Persepolis.

high admiration, at the same time feeling some desire to know what was the solid information behind this artistic rhapsody. Now we have it, and it seems very insufficient, though we cannot regret having the drawing, if people will only regard it as a rhapsody, and not as sober fact.

Perhaps no architecture presents so singular a mingling of suggestions and associations as antique Persian. In its employment of bas-reliefs of winged bulls as entrance decorations, in its lion friezes, its battlemented terminations, in the general feeling pervading the architectural design, it has strong affinities with Assyrian art. In the decoration and treatment of some of the doorways we seem to see Greek detail in a less refined form; in the doorway from a hypostyle hall at Susa, for instance, given (page 129) from Dieulafoy, we see the moulded architrave with the repeated rosette ornament on the space between the mouldings, as in the Erechtheion doorway, and a coarsely designed head-and-reel ornament within the inner moulding; while again in the crowning member or cornice of the door-architraves we see the distinctly Egyptian form of cornice (fig. 8),

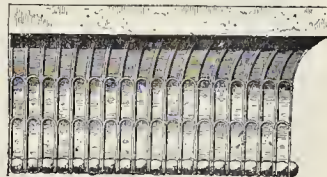


Fig. 8.—Cornice of Doorway, Persepolis.

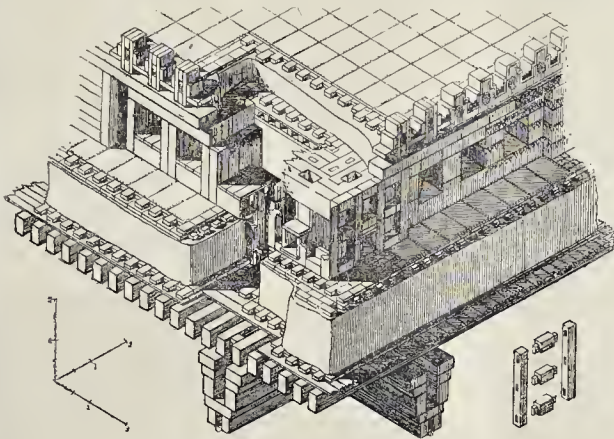


Fig. 7.—Restoration of Timber Roof, Persepolis.

though with a difference in the surface ornamentation, the ribbing being in three tiers instead of continuous, and the lower member a head-and-reel instead of a continuous roll. It may be observed that the profile of the cornice, as shown in this illustration, is much less refined in its curve than the best Egyptian examples, being apparently a mere segment of a circle at the top, whereas the Egyptians employed a more refined compound curve, apparently part of an ellipse. The few mouldings given in the book, it may be observed, are sufficient to show the coarse perception and practice of the Persian architects in respect to this important class of detail, a defect which in itself would be sufficient to put their architectural art on a second-rate level. In regard to the quasi-Egyptian form of door-cornice, the authors observe that Texier, in his restorations of Persian architecture, crowned all the buildings with this moulding, as in Egypt, because he had found it on the door architraves; but of course the theory (which seems incontestable) that the roofs and main cornices were of timber would leave no place for such a feature there.

The typical plan of a Persian palace, with columns equally spaced over the floor, may also have some connexion with the Egyptian temple plan, as the authors suggest; though to our thinking the central avenue with larger and loftier columns and a clearstory over them, typical of the Egyptian plan, is so important and so fine a feature that we can hardly imagine any architects of another country copying the Egyptian pillared hall and omitting that feature, and therefore we should be disposed to doubt the connexion between the two; if the Persian pillared hall is copied from the Egyptian, it is miserably spoiled in the copying. In regard to the large hypostyle hall at Persepolis, the authors criticise Fergusson's restored plan,* in which Fergusson shows complete walls surrounding the central mass of columns, and crossing at the angles, like very much developed antæ, so as to flank and "stop" the outer colonnades on the front and sides. We quite agree with them that Fergusson's small chambers placed in the re-entring angles of the crossed walls are

* Fergusson's "History of Architecture," second edition; Vol. I. Fig. 90.

doubt, and the restoration of it is a remarkable exercise of architectural ingenuity; but after all it is only ingenuity, and the drawback to this kind of invention is that when laid down in an elaborate drawing in this manner, it is liable to be taken by many readers as proven fact, and even to stand established as a precedent for future archaeologists to base further theories on. It was a weakness (some people may call it the reverse) of the late Mr. Fergusson, that whenever he had framed what appeared to his mind a satisfactory theory about any detail of plan or construction in ancient architecture, he thenceforth regarded and referred to it as if it were ascertained fact, and this dogged persistency in his own belief had really a great deal to do with the wide acceptance he obtained for many of his views. His theory as to the lighting of the Greek temples, for instance, seemed so consistent and logical, and was so positively asserted by himself, and moreover would no doubt have been such an effective and effectual mode of internal lighting, that people gradually came to forget that there

was not a shadow of proof or indication of it in any ancient remains, coins, or descriptions, and that all that could be claimed for it was that it was quite possible, and not entirely at variance with the pediment termination of a Greek temple. Now that it has been suggested that after all, in a bright climate, the open door might give all the daylight that was wanted in a temple interior, it is seen that Fergusson's elaborate scheme was quite uncalled for, and probably little more will be heard of it among those who think for themselves. Yet it is only a few months since that we saw it stated in the syllabus of some educational lectures on architecture as if it were historical fact. So it may be with M. Chipiez's restoration of the roofs and ornaments of the Persian palaces, which nevertheless are conjectural in all but the profile which alighted on the stone piers. The volume contains an excellent chromolithograph reduction from M. Chipiez's beautiful water-colour drawing which was exhibited in the Architectural Gallery at the Paris Exhibition of 1889, and which we mentioned at the time in terms of

purely imaginary and do not look very probable; but his front line of wall, separating the front colonnade from the square columned hall in the rear, follows the line given by the existing masses of masonry forming the jambs of the great doorways behind the front colonnade, and central with two of its intercolumniations; and if this front wall is admitted, the side walls follow as a matter of course. But then, say the authors, on the plan of the existing remains of this hall (given as Fig. 148 in their book), there will be seen traces of drains, which run right under the line of Fergusson's side walls, "a strange oversight on the part of the architect thus to undermine his own work"; and if this plan is correct, the criticism is a sound one. In this



Fig. 9.—Head of Lion from Frieze, Susa.

case the authors opine that the remains supposed to represent doors are only ceremonial niches or state arches standing free, and which did not form part of any wall. But then the plan with the drains is only reproduced from Flandin and Coste, and rests on no personal observation of the present authors, and in regard to the so-called door-jambs, only minute examination on the spot could decide whether these were or were not parts of a continuous wall. We agree that Fergusson's plan looks clumsy and doubtful, and the suggestion of the authors that the hall had no solid surrounding walls but was a great columned enclosure of state is interesting and worth attention; we must refer the reader to the book for the full arguments and illustrations; but all this as well as other speculation in the book appears, as far as we can understand, to be based on second-hand evidence; very good second-hand evidence, but still no more than that. To get through such a series of works as the authors are bringing out it is necessary to trust a great deal to second-hand evidence, but no one can have any right to speak positively on such a point as this one, for example, except on the basis of direct personal inspection; plans taken from other publications may be prejudiced in ways we do not know of; the most careful and conscientious account or delineation in books may convey an impression quite different from what a personal inspection gives. And we are rather in this difficulty with MM. Perrot and Chipiez's books, that we do not seem to have a clear understanding as to how much they are giving from their own observation and how much on the authority of other narrations. That there has been a certain amount of personal observation is evident, it is also evident that there is a great deal of second-hand information, and it is for the most part not very easy to say on whose particular observation any one statement rests.

The authors devote more space than was at all necessary to answering M. Dieulafoy's extravagant idea (founded upon a single

occurrence of the arch in combination with a badly-designed cornice of the type shown in fig. 8) that the Sassanian type of domed architecture was an antique Persian type practised concurrently with the columnar type of Persepolis; a supposition which can only prove that M. Dieulafoy, though an ardent and successful explorer, is no archaeologist.

We must refer the reader to the book itself for any account of the funeral architecture of the Persians, and for the largely illustrated chapter on their sculpture and decoration, among the illustrations to which is included a fine chromo-lithograph representation of the now celebrated lion frieze in glazed terra-cotta, discovered at Susa by M. Dieulafoy, and the "archer's frieze" from the same place. The lion frieze, though stiff and formal, is very forcibly modelled, and may be considered a masterpiece of conventional treatment of animal forms as ornament. We subjoin a reduced reproduction of the detail of one of the lion's heads (fig. 9), to show the character of the work.

We regret to have to point out that the translator of the book (whose name is not given) is not up to his work; he evidently does not understand many French architectural terms, and supplies them by a mere adoption of the same expression in English, with a result which must be puzzling to readers who are not acquainted with architectural phraseology, and irritating to those who are. Of instances where words are used without meaning or with a wrong meaning, we note "lofts" and "cranks" (p. 48); the "membering of bases" (p. 53) meaning the moulding; "plat-band" over and over again as a translation of "plate-bande," which merely shows that the translator does not know what "plate-bande" means in French; a "quincunx" (referring to arrangement of columns) is described in a "translator's note" as "a square of four, with one to follow," which is nonsense; we read of "well-squared units" (stones in a masonry course), which is merely clumsy French-English; of the "spires" of the Ionic capital; of "dentels," of a portal in which "five delicate listels are happily opposed to a platband;" of "extra-dosed (*outré-passées*) arches," which is absolute nonsense, "*outré-passées*" meaning horse-shoe arches, returned past the level of the springing; of a "bay full centred," which is the translator's attempt to render the French expression for a semi-circular arched bay; "sculpture" is used (p. 494) where carved ornament is evidently meant by the authors; and on the same page one of these ornaments is described as "a baguette which resembles a chaplet of oves," a definition which we decline to attempt translating into English, save to suggest that it is a possible reference to a bead-and-reel ornament. We have found several other reference numbers to cuts; "fig. 88" (p. 174), "fig. 74" (p. 182), "fig. 111" (p. 359) are all wrong. This is carelessness, but the other blunders arise from sheer ignorance of the subject; and if the publishers are going to issue translations of other French works of this class, they should be warned that it is necessary to engage a translator who has a knowledge of architecture as well as a knowledge of French. In other respects the book is admirably produced. It should be observed that the illustrations given with this article are not to be taken as adequately representing the illustrations of the book; they are merely selected as necessary to explain our remarks, and have been reduced in size, and portions of them in some cases omitted, to bring them within our available space.

SEWERAGE, WOODHALL SPA.—The *Nottingham Express* reports that the Horncastle Rural Sanitary Authority, at their meeting on the 23rd ult., approved the scheme for the sewerage of Woodhall Spa, prepared by Mr. Herbert Walker, A.M.Inst.-C.E., of Nottingham. The present sewers will be utilised for storm water, and the Shone system is to be adopted for carrying away the sewage. Application has been made to the Local Government Board for sanction to a loan to cover the cost of these works.

NOTES.



the instructions to architects for the Bournemouth Pavilion competition, which have been drawn up under the direction of Mr. Charles Barry, we observe that a good example is set in regard to the pecuniary dealings with the competitors,—of which competing architects have often much reason to complain. In the first place it is stated that if the Council carry out the work, the architect whose design is selected will be employed to carry it out on the usual terms, in addition to the 50% paid as a premium. As every one knows, the usual practice is to "merge" the premium in the commission, as if the labour of preparing the competition drawings went for nothing. Secondly, if no instructions to proceed be given after twelve months to the architect whose design has been selected, "he shall receive such reasonable compensation (in addition to the fee of 50%) as may be agreed upon by the Council." Thirdly, inasmuch as an increasing practice has been set up of requiring a deposit payment of a guinea or more before an architect can obtain a copy of the instructions, we observe that in this case the deposit will be returned not only on receipt of a design, but on the statement of any architect, within two weeks after receiving a copy of the instructions, that he is not prepared to submit a design. Some time ago we called attention to the practical unfairness of requiring a deposit payment for the instructions which was only returnable on receipt of a design; for this reason, that the architect in most cases has no means of knowing whether the competition is such a one in its terms and requirements as he would wish to go in for, until he has perused the instructions, so that he really is made to pay for them in the dark and on pure speculation. In these respects the conditions of this competition show a great advance in liberality and fairness in dealing with competing architects, for which no doubt they may thank the influence of the assessor; and as Mr. C. Barry, among other qualities, is a very good man of business, the promoters of competitions may take it that the conditions which he has suggested are such as are practically fair to all parties, and we hope the lesson will not be lost in the preparation of conditions of competition in the future.

A VISITOR from Paris who has been exploring London in other quarters than the principal thoroughfares expresses himself strongly, in a letter to us, in regard to the deficiencies in the indication of the names of streets, both as to the want of sufficient name-plates, the small size of the writing in some cases, and the want of system and uniformity in the lettering and design of street names. It is not surprising that any one accustomed to the regular and clear street-labelling of Paris should make such a criticism, and of course the inconvenience of this deficiency in our street naming is felt by a stranger endeavouring to make acquaintance with London to a much greater degree than by a Londoner. We have often remarked, however, the haphazard manner in which the labelling of streets is carried out in London, which much needs a thorough reform, and we are glad to give currency to our correspondent's complaint.

SEVERAL well-known artists and public men, headed by the Duke of Westminster, put their names the other day to a short letter in the *Times* expressing their great regret at the proposed demolition of Emanuel Hospital, Westminster; a regret which we fully share. In the *Times* of Tuesday last the Earl of Carlisle (to use an American phrase) "goes them one better" in a letter adding his protest, and describing the proceeding as "a wanton piece of vandalism." To express regret is one thing; to talk of "wanton vandalism" is another, and the expression only shows how little some of

these aesthetic protestants are able to weigh the meaning of words or to look at two sides of a question. It appears that the building is no longer practically fitted for the purposes of the charity, and that by selling it the trustees can obtain funds which will enable them to administer the charity more effectually and to provide a building suitable to modern requirements. Under such circumstances they would not be doing their duty if they followed any other course, and there is obviously nothing "wanton" in the matter, unless we were to call the Earl of Carlisle's language wanton abuse of words. Two or three of the men who have protested are very wealthy; will they buy the building and site and present it to London? Every one will thank them for that; but they have no right to abuse trustees of a charity for selling property which has become useless for the purposes of the charity. The building, after all, is not pulled down yet; and at the worst it is not the trustees of the charity who are pulling it down; they are only selling it.

IT is singular how those who are interested in seaside resorts are constantly doing their best (from mere money-grubbing motives) to make them less attractive. Lowestoft has many attractions over various marine resorts, not the least being the stretch of common at the northern end, well raised above the sea, and separated by the Yarmouth-broad from the cultivated land which runs inland. But the common appears now to have fallen into the hands of a building syndicate, together with other land in the vicinity, and it is the desire of those who now possess the common to cover it with buildings. Such a piece of land, breezy and bracing, is invaluable as an open-air resort. Covered with lodging-houses, it will cease to be an attraction to the seeker after fresh air. It is too far from the beach to be appreciated as a building site by what we may term the cheap seaside frequenter. It should be retained as an open space. If this were done, and good-class houses were built on the west side of the high road, it would make them some of the most "desirable" residences on the east coast, being within easy reach of the sea, not distant from Oulton Broad, and with an open space in front. If there is any public spirit in Lowestoft it should be stirred to prevent this common from being sacrificed to the builder. If this mistake can be prevented it will certainly be to the ultimate profit of the town.

IN the last issue of the German Archaeological Jahrbuch (1892, vii. 2), Dr. Winter has a valuable paper on a particular branch of the ornamentation of Greek vases. It has the rare merit of being fully illustrated, so that it can be read and understood without reference to the illustrations of countless other foreign publications. The decorations discussed are those that occur below the handles of Attic cups. So little attention has been paid to this branch that not infrequently the main designs of a vase are published and discussed while the subordinate decoration beneath the handles is wholly omitted even from the picture. After Dr. Winter's paper, this omission will become an impossible anachronism. He clearly shows that this subordinate part of the decoration is subject to a development as marked and as definitely chronological as that of the main design itself. Nay more he shows that within its limits certain mannerisms occur characteristic of certain masters, so that the decoration below the handles become an additional piece of evidence in the attribution of doubtful vases to particular names. Much of Dr. Winter's work in this special branch was carried on at the British Museum.

THE French School of Archeology at Athens is not yet, according to the report of the new director, M. Homolle, fully re-organised. It, therefore, issues this year only a *supplément* to the full number of

the Bulletin for 1891. This supplement contains a valuable *résumé* of news as to recent excavations. Most of these we have from other sources noted before, but some items from French sources for the most part, appear here for the first time. M. Holleaux, in a letter to M. Homolle, reports the concluding operations at the Sanctuary of Apollo Ptoios, near Acraiphie, in Boeotia. Besides a mass of archaic inscriptions, containing, among other valuable things, two signatures of sculptors hitherto unknown, the last year's work has been specially rich in bronzes. Among these, unquestionably the most important are a whole series of archaic bronze plates decorated with repoussé work; the designs include decoration that is merely linear, subjects drawn from the animal and vegetable world, friezes of fantastic animals, and, finally, certain mythological scenes. One plaque, which is fairly well preserved, represents the combat of Zeus with Typhon, and is therefore of interest for comparison with the archaic sculptured pediment found in the Athenian Acropolis; another represents the punishment of Prometheus. At the first glance, M. Holleaux says the analogy is striking between these bronzes and those supposed to be of Argive origin, found at Dodona, Olympia, and at Atheus. The most interesting of these are shortly to be published in the *Bulletin*. M. Holleaux greatly regrets that the limited funds at his disposal have not enabled him to excavate or even precisely to determine the site of the theatre, the existence of which is certain from inscriptions. At Lepreon, in Elis, important ancient remains have long been subjected to repeated depredations by the people of the neighbouring village of Sprototzi, who eagerly sought after both stone and lead for the building of their houses. Happily, Dr. Dörpfeld reported on these depredations to the Ephor of Antiquities, and they have been stopped. It is proposed shortly to begin a regular system of excavation. Dr. Dörpfeld thinks that the ruins must belong to one of the temples mentioned by Pausanias, either that to Demeter or to Zeus Lusukaios. More it is impossible at present to say, except that the building was a peripteral temple, dimensions 11 by 19 m., with cella and pronaos. On the lower terrace architectural fragments of all sorts are lying in masses,—drums of columns, Doric capitals, triglyphs, and metopes. It is hoped that these excavations may yield rich results.

MR. HENNIKER HEATON'S latest method of drawing attention to un-redressed postal grievances is decidedly novel, not to say amusing. This irrepressible member for Canterbury has addressed a letter to the *Times*, in which is incorporated a suggested "Supplementary Post Office Report," which he submits to the Postmaster-General for his approval and signature. It consists of nineteen clauses, which are virtually so many confessions of failure or of indifference, and the Postmaster-General is apparently invited to throw all the blame upon the high permanent officials of the Department, "who," he is made to say, "are my advisers, or rather controllers." A variation of this refrain is introduced into the majority of the nineteen clauses, culminating in the following crushing piece of sarcasm:—"There is a tendency among the postal staff to resist the introduction of changes in administrative methods as far as possible. Their eyes are bandaged with red-tape, and their ears are stopped with sealing-wax. They hold that the Department received so sudden and violent an impetus in 1840 that it will be absolutely necessary to apply the brake for at least another century." The Postmaster-General is invited "to blush to acknowledge that a fee of 2d. is still charged for a receipt for a 6d. telegram, although the Exchequer only receives 1d. on a receipt given by a merchant for 1,000." This is an anomaly which would certainly not be tolerated but

for the fact that such receipts are very rarely required. Another of the matters dealt with is one which we remarked upon not long ago,—viz., the inability of the English public to obtain the stamps of the British colonies and dependencies; it being, therefore, impossible to enclose with a letter addressed abroad the proper stamp for a reply, however desirable it may be to do so. The helpless and apologetic official is made to say, "I have found myself powerless to effect this reform, although, like every sensible man, I am convinced that it would be very useful and convenient." It appears that at Melbourne, Sydney, and other large colonial towns, our British stamps are regularly sold, so that it should not be such a difficult matter to obtain Australian and other colonial stamps at home. Formidable as is Mr. Henniker Heaton's list of postal anomalies, several of the old grievances have dropped out, and the indefatigable perseverance of the hon. member, and his characteristic freedom of utterance (always irrespective of the Party to which the chief at St. Martin's-le-Grand for the time being belongs), will doubtless result in the gradual removal of others.

LORD FITZWILLIAM'S seat, Milton, or Abbey Milton, which narrowly escaped from destruction by fire a few days ago, is situated in Castor parish, near Peterborough. Eight hundred years ago the Abbot of Burgh had two hides in Meletone, and it continued to be held of the Abbots of Medebamsted by various people,—amongst them being Richard de la Pole, and the De Veres, Earls of Oxford,—until the attainder of John de Vere, in 2 Edward IV., when it passed to Richard, Duke of Gloucester. The property was held next by the Wittsburys, of whom Robert Wittelbury conveyed it, in 18 Henry VII., to William Fitzwilliam, a descendant of Sir William FitzGodric, cousin to Edward the Confessor. He is the Fitzwilliam, a citizen of London, whom Henry VIII. knighted and made a Privy Councillor upon his spirited justification when taken to task for sheltering his former master and benefactor, Wolsey, after the Cardinal's downfall.* His grandson, Sir William, was governor of Fotheringhay during Mary, Queen of Scots' imprisonment there; and on the demolition of that castle several coats-arms were removed to the hall and parlour windows at Milton. The main portion of the house was built in the middle of the sixteenth century. The principal, and Tudor, front consists of several bays, embattled, on the ground and first floors, and an attic story above. The lower two rows of windows have mullions and transoms. The entrance bay is Renaissance, having a circular-headed doorway, with pilasters on both floors; see the plate by J. P. Neale, in vol. iii. of his "Seats," 1820. Sir Christopher Wren married, in St. James's Palace chapel, on February 24, 1677, Jane, daughter of the second Lord Fitzwilliam, as his second wife. Their daughter Jane was buried in the crypt of St. Paul's. Her epitaph is as follows:—

M.S. Desideratissimæ virginis Janæ Wren, clarissimæ. Christopheri Wren filiae unicae; paternæ indolis, literis deditæ, piæ, benevolæ, domiesticæ, arte musicâ peritissimæ. Ob. 29 Dec. 1702: aet. 26.

Her mother was buried in St. Martin's-in-the-Fields on October 6, 1680. Marbold Church, which the family restored in 1808, contains many memorials of the Fitzwilliams; that of the first earl, *obit* 1719, and his wife, is described as "by Jacob Fisher of Camberwell."

IN a "Note" on March 19 last we adverted to an offer made by Sir John Lennard, Bart., lord of the manor, to sell for 2,000l. his interest in West Wickham Common. At the close of a public inquiry, held last week, at Beckenham, by an Inspector of the Local Government Board, Mr. Talloch, the Inspector, said he would report favour-

* Confer, the record, compiled, in 1565, by Hugh Fitzwilliam, of Sprotburgh, co. York.

ably upon a proposal by the Beckenham Local Board to contribute 100% towards the purchase-moneys. It was announced that of the total 2,000,000 asked for, private individuals had subscribed 1,200,000, in addition to 500,000 by the London Corporation, who will, it is expected, formally open the ground in the course of this month.

MR. EDWARD WHYMPER'S little manual on "How to Use the Aneroid Barometer," will be much appreciated by those who desire to use the instrument with any approach to scientific accuracy. One of the first problems the author set himself was to ascertain whether the means of the readings of several aneroids would or would not accord with the mercurial barometer at low pressures, the idea being that the plus errors of some instruments might balance the minus errors of others; but it was soon found that each instrument indicated lower pressures than the mercurial barometer, and means of the whole were, consequently, less than the truth. From this it would follow that a great part of the altitudes throughout the world which depend upon observations of aneroid barometers made while ascending, must be too high, and that a general lowering of them will be found necessary. Mr. Whympers' investigations have extended over a period of eleven years, and the general results, as given in this little work, are of much importance, and should be carefully studied by engineers and travellers who have occasion to use the instrument.

THE Society of Engineers' "Transactions" for 1889, edited by their secretary, Mr. G. A. Pryce Cuxson, which has been lately published, will be found to contain many papers of professional interest. The President, Mr. William Newby Colam, in his inaugural address, congratulates the members upon not only the continued, but the increasing, success of the Society, there being at that date 448 members of all classes, an increase of 8 per cent. on the previous year. After giving a brief outline of the Society's work for the past year, the President described many of the large works that had been recently proposed or carried out in different parts of the world. There are many other instructive papers in this volume, contributed by men who have made a special study of the subject upon which they write; but the one by Mr. George Maxwell Lawford, on the "Drainage of Town Houses," which was followed by a good discussion, will probably most interest our readers.

A VERY interesting lecture on the proposed Nicaragua Canal was delivered before the Franklin Institute last January by Mr. Geo. W. Davis, the General Manager of the Company which has been formed to carry out the undertaking. The author points out that the physical features of the lake and river route by Nicaragua have been carefully studied in all their relations, and have been made the subject of plans thoroughly elaborated in all details, and of estimates carefully calculated; and competent engineers pronounced the project unembarrassed by any difficulty save that of magnitude, which, in this age, is a hindrance only when it advances the cost of construction beyond the limit of remunerative returns. The first complete instrumental survey of the route was made in 1850, but many others have been made since, and a large amount of knowledge regarding the country has been obtained. Commencing on the Atlantic side, the canal runs directly across low ground for the first ten miles, and must be formed by dredging, the soil being composed entirely of sand and clay. In the next three and a half miles there are three locks, and afterwards the canal traverses basins which are created by damming the streams which flow across the line. At about thirty miles from the Atlantic it enters the San Juan river, and for sixty-four miles there is free navigation, the river being wide

enough to allow the largest steamers to pass each other at full speed. At the end of this river portion of the canal is Lake Nicaragua, across which there is clear sailing for fifty-six miles to the point where the canal leaves the lake upon its western shore. Only seventeen miles of canal is now required to reach the Pacific ocean, and, although there are three locks upon this length, there is no especially difficult work to be done. The total length of the route is 170 miles, which distance, allowing for the six locks, it is expected will be traversed in twenty-eight hours. To form the canal some 70,000,000 cubic yards of excavation will have to be done, and 10,000,000 cubic yards of embankments formed. The Company's estimate for the total expenses in carrying out this work is 25,000,000, which is about the amount the Suez canal cost, and they consider it will take six years to accomplish.

IN 1884 a building called Hampden House was established as a kind of residential club in the north-west of London, in order to provide young men of moderate and small means, employed in business in London, with a home where they would obtain congenial companionship. No object could have been more praiseworthy, for there cannot be a doubt that solitary lodgings are bad for the moral and physical health of very young men. This institution, if it may be so called, appears to have been so successful that the establisher of it, Mr. T. Eccleston Gibb, is now turning it into a limited company. Mr. Gibb is to receive from the company 10,000,000 in shares, 60,000,000 in mortgage debentures, and 60,000,000 in cash, — in all a nominal sum of 130,000,000, — as the purchase money of the freehold property and the undertaking. Philanthropy would seem from this to be by no means an unprofitable kind of business. We observe that no valuation of the property of any kind is given in the prospectus, nor are we told what was the cost of the site and the buildings. We are far from censuring anyone for making money out of such a useful institution, but it would be more seemly, under such circumstances, to omit from the prospectus the blessings of divines on "this noble work." A good commercial return is quite sufficient attraction, and on the whole such institutions are most likely to flourish when they are undertaken simply and solely with a commercial object.

IT is to be wished that all the working men who are clamouring for a legal limitation of the hours of labour should know the little story in connexion with it related by a lady in a letter to the *Times* of August 30, of the labourer who came home in the evening and told his wife he had been at a meeting about the eight hours, and she was to make haste and get his tea. "Get it yourself," was the answer, "my eight hours is over." Eight hours politicians had better reflect a little on that answer; they will find it of rather wide application.

THE BRITISH ARCHEOLOGICAL ASSOCIATION AT CARDIFF.

WE now resume and conclude our report of this Congress.*

The programme on Wednesday, August 24, was a very varied and enjoyable one, since it provided for a journey through some of the most beautiful scenery of the south portions of Glamorganshire, as well as for the inspection of many objects of interest. Proceeding along the main Roman road into South Wales, now represented by the modern thoroughfare from Cardiff to Newport, the picturesque village of St. Mellon's was passed, and a sight obtained, and no more, of its ancient church, standing on high ground. The first halt was made at the large old mansion of Cefn Mably, the seat of the Kemys-Tinte family. Here Mr. E. Seward briefly described the history of the fabric, from the period when a Norman castle was erected on the site to the time when the present house was

erected. The defence of Cefn Mably during the civil wars was referred to, and the points of encounter indicated. Some traces of hasty fortifications had already been passed in the park. The mansion is a long building, worthy of the period of Queen Anne, with a large coved cornice of plaster, which extends around the fabric. Traces of Tudor work are visible here and there, but nothing of Norman date is apparent above ground. The gardens are very extensive, and were seen in their full summer beauty, and the house commands a superb view of the surrounding country and over the Bristol Channel. Within, the rooms have some admirable pieces of old furniture and tapestry, while the "Soldiers' Gallery" contains a table in part composed of a plank of oak, 42 ft. 8 in. in length by 6 ft. or 7 ft. in width, said to have been cut from a tree grown on the estate.

Under the guidance of Lord Tredegar, the party proceeded through Ruperra Park, and inspected some curious mounds, which face due south. They are surrounded by shallow ditches, and were pronounced to be funeral. One had been cut open for inspection, but the trenches revealed only a few fragments of charcoal, the opinion being that the excavation had not been carried down sufficiently deep. The journey was then resumed through the village of Rudry, along a hilly road in full view of a beautiful range of mountains, past the partially ruined mansion, The Van, to Caerphilly Castle. Here the party partook of luncheon in the ancient banquetting-hall, on the invitation of the Marquess of Bute. Afterwards the ruins of the Castle were described by Mr. Robert Draine, F.L.S., whose remarks were aided by a large plan. The fortifications were of great strength, and the system of defence was described. It was noted with satisfaction that by the Marquess of Bute's care a sufficient amount of pointing is being done to the walls, the massive nature of which, however, ensure the preservation of this fine ruin for many generations. After leaving the Castle, the progress was through the village of Nantgarw, once the seat of a well-known china-manufactory, the site of which was pointed out. Castle Coch, finely seated on the side of a high hill, was also passed. It was restored from a very ruined condition from the plans of the late Mr. W. Burgess, who designed the work for the Marquess of Bute, and it is now a complete specimen of a Medieval castle of moderate extent.

Llandaff was reached late in the afternoon, and the party had but short time to be present at a garden-party given by Lady Hill. Only a passing glance could be given to the Cathedral, under the guidance of Mr. Coates Carter.

In the evening, papers of much interest were read at the Town-hall, the first being on "Early Christianity in Wales," by the Rev. H. Cart, in which many evidences of the planting of Christianity in the Principality were adduced, and the foundation of the Welsh Bishopsrics traced. An animated discussion followed.

The second paper was on the "History of St. Fagans," by the Rev. W. David, who not only referred to the legendary history of St. Fagan, but traced that of the parish, concluding with a description of the battle between the Royalists and the forces of the Parliament.

In consequence of the extent of the programme of places to be visited, it was decided that the party should be divided for the work of Thursday, August 25.

Accordingly, one part of the company proceeded to inspect Cardiff Castle, which was thrown open for the purpose by the Marquess of Bute. Under the guidance of Mr. E. W. M. Corbett, the private apartments and the many art works were examined, and Mr. Godwin, in the library, pointed out the most remarkable of the literary works. The walls of almost all parts of the castle are richly decorated from the designs of the late Mr. W. Burgess, but the ancient portions of the castle have been but little interfered with. The mined keep still stands on its grass-covered mound, and the result of recent researches are apparent by the marking-out of many points of interest that have been uncovered. These are now indicated by the erection of new walling carried up to a certain height, and then discontinued. By this means, all the positions of draw-bridges, curtain-walls, portcullises, and similar works of defence are clearly shown. During recent years it was ascertained that the enclosing banks of the castle-grounds, which indicate a well-defined outer ballium, in reality are heaped up above an ancient red wall of defence, there being towers at intervals.

* See *Builder*, p. 167, ante.

The work proved to be of Roman date, and for the first time it became evident that Cardiff had been a Roman station. The walling is much broken down, and the original height cannot be made out with certainty. But it is perfect at the base, and since the earth that has so long buried it has now been removed from the east side of the enclosure, by the direction of the Marquess of Bute, this portion is now revealed to view. It was pointed out by Mr. J. Storie, Curator of the Cardiff Museum. A trench has also been carried through the bank which covers the inner face, and the thickness of the Roman wall has been ascertained to be about 10 ft. It is faced with blue lias stone, squared, and laid horizontally. The ruins of the Black Friars and the White Friars, both contained in the grounds or gardens of the Castle, were inspected, after which the Roman relics found at a villa at Llantwit Major were shown by Mr. Storie in the Cardiff Museum.

The other party, under the guidance of Mr. Loftus Brock, visited Caerleon-on-Usk, or City of Legions, the site of the famous Roman capital of Britannia Secunda, and for many years the station of the Second Legion. By the courtesy of the authorities the museum was thrown open for inspection, and its collection of tessellated pavements, inscribed stones of the Second Legion, and many other treasures found on the spot, were examined. The church contains some portions of Early Norman architecture, built, probably, with Roman stones. The walls of the station are traceable here and there, there being sufficient to show that the enclosure was in the form of a parallelogram, 1,620 ft. by 1,850 ft., only in size, traversed by the Via Julia. The angles, where visible or traceable, are boldly rounded, and it was pointed out that one of these had been rebuilt at a later period, when ponded brick, not visible elsewhere in the walls, was used in the mortar of this portion. A hurried visit was paid to the huge mound which was thrown up at some later time over the walls of a Roman villa, which are thus buried in part beneath it. Afterwards, the amphitheatre, a construction of earth overgrown with grass, and popularly known as King Arthur's Round Table, was inspected.

In the afternoon the united parties proceeded to visit the Church of St. Fagans, where the Rev. W. David, M.A., pointed out the well-known and very beautiful geometrical windows, and some other features of interest. Progress was then made to St. Fagans Castle, an Elizabethan fabric of many gables, the entrance front being in the common form of the letter E. A remarkable fountain-base, in front of the entrance, attracted a good deal of notice. It is circular, of cast lead, and of large size, the decoration being very elaborate and good. Arms with many quarterings are mingled with scroll-work and arabesques. The date is 1620. Inside, the mansion has some good examples of carved panelling and plaster ceilings, one of the latter being repeated in a second apartment, and it occurs again in a hall in the vicinity. The garden front commands a very fine view, and the terraced gardens are of considerable extent. Thanks were rendered to Lord Windsor for permitting the horse to be visited.

The party next proceeded through beautiful and very diversified scenery to the modern mansion of Mr. G. T. Clark, F.S.A., the eminent antiquary, at Talygar, where a large company of ladies and gentlemen had assembled to meet them. Mr. Clark pointed out to his guests many of the numerous art-treasures of his house, among which some particularly good suits of armor were noted. Refreshments were partaken of, and an agreeable afternoon was spent, the party returning to Cardiff at a late hour.

Notwithstanding the delay occasioned by the late arrival, the evening meeting was held, and a paper was read by Dr. Phené, LL.D., F.S.A., entitled "Arthurian Necropolis." It was illustrated by a large number of photographs of almost all the sepulchral remains of prehistoric times in the county of Glamorgan.

Friday, August 26, was devoted to the exploration of some remarkable sites, memorable in the history of Early Christianity in Wales, and also a group of no less remarkable megalithic remains. Proceeding along the high road, more or less on the site of the Via Julia for a few miles, the party branched off to reach the Cromlech at Dyffryn, which, now denuded of the large mound which once covered it, stands out prominently to view. Its stones are of enormous size, and the prominence of its position renders it an object of unusual interest.

But the Cromlech at St. Nicholas, at no great distance, is still more remarkable with respect to size, the top stone being the largest in Britain, the length being more than 24 ft. by about 13 ft. It is still partially covered by a mound of stones and earth, but sufficient has been removed to enable the interior to be inspected. Standing on the covering stone, Mr. Franklen G. Evans, J.P., F.R.A.S., gave a lengthy description of megalithic remains of all sorts and kinds, in various places, the notice of the actual remains before his audience being lost in his widely-extended remarks. The site, which is in part a fir-grove, is one really demanding careful survey, for remains of avenues, hurried stones, traces of stone circles, cromlechs, and single stones are apparent in several places, showing apparently that here was a necropolis of very extended size, never yet surveyed with completeness. Llanccarvan Church was at last reached, and Mr. O. H. Jones, J.P., of Ffnonn Castle, pointed out the salient features of the fabric, some portions of which are supposed to be the work of Walter de Maes. The site of a celebrated monastery, supposed by many writers to have been here, was more probably, in the judgment of the speaker, at Llanvithen, at no great distance. It is dedicated to Cattog the Wise. But, indeed, in respect to the dedications, almost all the churches visited during the Congress are dedicated to personages of early date, whose names are but rarely heard of elsewhere, except in Cornwall or Armorica. The records is a portion of what must have been a very fine road-screen, the remainder of the lower portion being used as a screen to a south chapel. The junction of the two parts appears all but certain, although much discussion occurred with respect to it. At Llantwit Major, after having passed the fine cruciform church at St. Athans and the ruins of Boverton Place without stopping, the antiquaries proceeded to inspect the extremely interesting church under the guidance of Mr. Ittyd Nichol, F.S.A. It consists of a western tower, formed on arches as a central tower, the aisles of the nave being flush with the western end. The chancel is capacious. To the west of the tower is a second church, having a south porch. To the west of this, again, are some attached buildings now in ruins. The western church has a very good open roof of oak sadly wanting present attention. It is not used for service, and is filled with peculiar coffin-shaped graves of a form common in the surrounding graveyard and in the others of the locality. There are also many curious effigies, and some of the interesting stones of early date, covered with interlaced work, which make this site so remarkable. One of these, a circular shaft retained to occupy some position at an angle, is still in capital preservation. The buildings are full of curious features, each of which demanded longer attention than could be given to them, especially those which appear to be for monastic uses, although none of the masonry is of very early date. Several detached buildings also exist of similar Medieval construction adjoining the churchyard, or within sight. The carriages being resumed, the party proceeded to visit Ffnonn Castle, an early work, built about a century after the Norman conquest of Glamorgan, and remodelled in the middle of the seventeenth century when the property came into the possession of the ancestor of the present owner. Mr. Jones led the party into the hall, and gave a graphic, although brief, description of the fabric, and the descent of the property. It has been in the possession only of two families since it was erected, and it has always been occupied. Tea having been partaken of, the company made the perambulation of the castle, under Mr. Jones's guidance. The homeward journey was through the beautiful grounds of Porthkerry Park to the Barry Station, the ruins of Barry Castle being inspected. They stand on high ground, overlooking the Barry Docks, close to the present remarkable development which is rapidly creating a new town on this formerly barren spot. The hour being late, and a train having been missed, the loss of time was in some measure regained by Mr. Storie's paper on the Roman Villa discovered at Llantwit Major, intended for an evening meeting, being read in the open air.

In the evening, Mr. J. P. Seddon's paper on "Llandaff Cathedral and its recent Restoration," was read, in the author's absence, by his partner, Mr. J. Coates Carter. This was followed by a description of some curious encaustic tiles by Mr. S. W. Williams, after which Mr. Fowler exhibited drawings of others of

similar design, and the proceedings were brought to a close by the reading of a paper on "Llantwit Major, a Fifth-Century University," by Mr. A. C. Fryer, Ph.D., M.A. All the scattered notices of Ittyd's celebrated foundation were collected by Dr. Fryer, and reference made to the probable subjects of study, derived from ancient Roman civilisation.

Saturday morning, August 27, was,—for the first time since the beginning of the congress,—wet and gloomy, in harmony with the news of the terrible colliery explosion at Aherkenfig, which was on everyone's lips. The steady downpour, and the early hour appointed for leaving, caused but a few of the party to brave the elements, and but a small part of the programme for the day could possibly be carried out. Leaving the Queen-street Station at 8.20 during a fortunate lull, the archaeologists proceeded along the beautiful valley of the Taff, in saloon carriages of the railway placed at their disposal, to Cowbridge, the intention having been to pay a visit to St. Donat's Castle, on the coast, and then to Ewenny. The continuance of bad weather, however, at Cowbridge, caused the first part of the programme to be abandoned, and it was finally decided to confine the day's proceedings to a visit to Ewenny Priory. Covered carriages having been provided, the party proceeded from Cowbridge along the line of the Roman Via Julia, and at midday Ewenny was reached. Here Colonel J. Pictou-Turhervill welcomed the party, in the name of his sister-in-law, and conducted the members into the ancient priory, after having offered them hospitality in the modern mansion which stands on the site of some of the monastic buildings. The church is a remarkable building, Early Norman in style, although, as described by Col. Turhervill, its foundation dates from 1141, the church consisting at present of a large low central tower, a wide nave shorn of its western bay, a south transept, and a presbytery. Traces of the north aisle are visible, and also of the north transept and two chapels, as well as of two chapels to the east side of the south transept. The early style of the workmanship recalls the statement made by Leland that the actual building was erected in the early part of the twelfth century, and that it was only given in 1141 to Gloucester Abbey by Maurice de Londres. This may account for the early appearance of the work here, but it is worthy of remembrance that Margam Abbey presented to the visitors equally early Norman work, although the date of foundation is there a few years later, with the record that the site was originally elsewhere. This was a fortified monastery, and, after inspecting the church, the guide conducted the visitors to two of the towers which defended the walled enclosure. There is a third, used later as a dove-cote, and in addition two interesting gate-house towers, one of which is in perfect condition. These date from Edwardian times. The nave of the church is now used as the parish church, and is separated from the transcripts by the lower part of the roof-loft wall, in which are doors of entry and exit, showing that, if used originally for parochial services, it did not cease to do duty for monastic processions. The roofs are for most part wooden and poor, but the chancel is vaulted in low, heavy Norman style, needing attention at no remote date. The foisted slab forming the founder's tomb is of great beauty, and in admirable preservation. Fine weather again favoured the party before the interesting and but little known priory was left behind, and Cowbridge was reached in comfort.

The closing meeting took place in the Town-hall in the evening. Papers were read by Mr. W. H. Cope, F.S.A., on "Cambrian Pottery and China," and by Mr. Loftus Brock, F.S.A., on "A Comparison of the Roman Stations of Caerwent, Caerleon, and Cardiff," in which he pointed out that while almost always in England walled towns were found only at the end of main roads, here were three walled enclosures in a series, while there was probably a fourth at Cowbridge.

Heartly votes of thanks were proposed by Mr. Alan Wyon to Dr. Vachell, Chairman of the Local Committee, to Mr. E. Seaward, its Secretary, and to all the noblemen, gentlemen, and ladies who had been so profuse in their offers of help and hospitality. The Congress thus brought to a close has been one of the most interesting and successful held by the Association in recent years. It has been very well attended.

ALTERATIONS TO THE PONTE ST. ANGELO, ROME (PONS ÆLIUS).*

"Come i Roman, per l'esercito molto,
L'anno del Giubileo, en per lo ponte
Hanno a passar la gente modo tolo;
Che dall'un lato tutti hanno la fronte
Verso 'l Castello, o vanno a Santo Pietro,
Dall'altra sponda vanno verso 'l monte."
Dante's Inferno, Canto 18, l. 28.

The pilgrims of 1300, to whom Dante compares the coming and going of the sinners in the Eighth Circle of his Inferno, have themselves contributed to lower, to sink out hollow, and to round with the shuffling of their shod or unshod feet, the masses of travertine forming the foot-paths of the Bridge of St. Angelo, held together with cramps and dovetails, as well as to wear the great blocks of lava with which the Emperor Hadrian had the great bridge paved, which joined his Mausoleum with the Campus Martius; "the handsomest and most convenient of Rome." Footpaths and pitching are just opened out to leave free passage to the new great wall of the Tiber side, and are only opened out to be destroyed; for the great wall of the Tiber, in regard to the Roman monuments it comes across, is what the lava of Etna is for the vineyards of Nicolosi. Nor are the footpaths and the pitching of the bridge of St. Angelo the only things to fall under the pick of the demolishers; the pickaxes and hydraulic levers of the engineers will descend and demolish the arches now opened up under the paving, and there will be built in their place, on one side, an arch equal to one of the three centre ones, while another will be constructed on the opposite side of the bridge against the castle.

This being done, the bridge of St. Angelo will lose its characteristic appearance, and instead of retaining its primitive aspect, will give us a bridge with five equal arches above a yellow ditch, the consequence of silting up. The medal in the Louvre, illustrated by Donaldson, shows what the bridge originally was, with its grand central arches to give passage to the ordinary water of the river, and with smaller arches on both sides for floods.

To have an idea of what the Tiber becomes under conditions to which it is now to be reduced, it suffices to stand on the Garibaldi Bridge, and to look towards the Island of St. Bartholomew, the island that Livy tells us was formed by the harvest of the lands of Tarquin the Proud, thrown into the river by the people who drove him from Rome. Here afterwards rose a temple to Æsculapius, and the whole island was margined with carved marble in the shape of a ship, in memory of the one that brought from Epidaurus the God of health.

The *Iola Tiberina* is now a peninsula, as it is joined to the shore by a vast sand-bank; in which ghastly rivulets are lost by absorption, or large pools of stagnant water putrefy after every little flood. The engineers of the Tiber have made a wooden dam opposite a pier of the Garibaldi Bridge, to turn a little water towards the sand-bank, but without effect; for, besides having neither noticed nor respected any part of the characteristic and noble aspects of the sacred river, they have not known how to avail themselves of that mastery of the waterway which Roman monuments show in the case of bridges. The Bridge of St. Angelo is one of these masterpieces; the great central arches were made to keep the bed of the river in ordinary times covered with water, and the side arches to give passage to floods, and thus form an architectural whole, the material result of needs provided for by the experience of ages.

It seems impossible that modern hydraulic science should so lag behind that it can give no better solution to this problem. The problem is to adapt this antique bridge to modern requirements. The solution proposed is to pull down the subsidiary arches, and make them identical with the principal ones, so that the bridge will then only pass over a muddy and sandy canal, and not over a tawny river.

THE ARCHITECTURAL ASSOCIATION.—As will be seen by an advertisement which appears on p. xx, the visit to St. Albans, which was announced to take place this Saturday, September 3, is postponed until Saturday, October 1.

* Translated from an article in the *Riforma*.
"What remained of the giant ship," writes Professor Middleton of Cambridge in his "Remains of Ancient Rome," "was lately destroyed in the grand alteration of the banks of the Tiber, which has greatly helped to destroy the beauty of this part of Rome. The very firm of the island was altered, and little now remains of that which was one of the most picturesque and interesting of Roman views."

RIVERS POLLUTION AND RIVERS PURIFICATION.

MR. H. A. ROEBLING, Assoc.M.Inst.C.E., in a paper read by him at the recent meeting at Bury of the Incorporated Association of Municipal and County Engineers, said that England is rightly looked upon as having taken the lead in the question of practical sanitation; but it is equally true, on the other hand, that it is from England whence the outcry about the pollution of streams and rivers arose. There is no town or village that is not confronted with the solution of this complex problem, which presents a somewhat new aspect in every case, and it was in connexion with proceedings against his Town Council for the pollution of the river Soar at Leicester that the author of the paper was for the first time brought face to face with what was in that case an embarrassing problem.

The question of the pollution of our rivers is by no means a modern one, and does not date from the introduction of the system of water carriage of all faecal matters. It is well known that in all parts of the globe the rivers and streams were looked upon for centuries as the medium for conveying away the filth and refuse of which communities wished to get rid. No doubt as long as the population on the banks of a river remained small, this did not cause a serious pollution; but when the towns increased in size and population, the nuisance such a course entailed became more and more serious, till at last it became an absolute necessity to take all the refuse and filth out of the river and provide other channels for it. This was the commencement of the systematic drainage of towns, which was intended to prevent the pollution of the subsoil of houses and streets, and to keep the rivers and streams within the town free from polluting influences. It cannot be denied that by the introduction of a proper and well-maintained system of sewers and drains for carrying away all refuse water and faecal matter the first object has been attained, viz., keeping off the subsoil clean; but as to the second object, the author is afraid that it has not been achieved in all cases. There are towns which purify their sewage, and which cause no pollution in the stream that takes the effluent, and there are others which cause serious pollution. It does not follow, however, that the first set of towns spend more money on sewage purification and purify their sewage to a higher degree than the second set, the sole cause in the difference of results being in some cases the river, into which the effluent goes. Some rivers seem to be able to deal successfully with any amount of sewage, others seem to turn sick at the smallest dose. There are, of course, other causes of pollution besides town sewage, such as the waste liquids from mills, factories, mines, &c., but as they are not of such general importance they will not be here considered. It is this different behaviour of the rivers that it is the author's intention to investigate, and to throw, if possible, some light upon what has been called the self-purifying power of a stream. For this purpose the author does not intend to confine himself to English rivers only, but proposes to review American, French, and German rivers as well, so as to give a complete survey of the present state of our knowledge of this question.

It will, of course, be admitted that no town has a right to keep its subsoil clean by a system of drainage and to dispose of its filth to the disadvantage of perhaps smaller communities lower down the stream by polluting it; but, on the other hand, it will equally be admitted that a town has a right to have its sewage works or sewage farm into the river on the bank of which it is situated; the degree of effectiveness of such treatment must be the state of the river after it has received the effluent. If the river is turned into a black boiling mass of putrefaction by the effluent, the purification of the sewage is said to be a failure, but if it is left sweet and pure after proper admixture, we look upon the treatment of the sewage as successful. It is the river that decides the degree of purification which must be attained by the sewage treatment, and in this respect any well-considered scheme of sewage disposal or sewage utilisation must start from the purifying powers of the river into which the sewage effluent is to go. The author is afraid this point has been overlooked in a good many cases, and rivers have been called upon to do work for which they were utterly unfit, hence their pollution. It may not

be possible in all cases to preserve the river water below large towns in that state of purity which it possesses near its source, but it is absolutely necessary to prevent its systematic pollution, be it by the effluent from sewage works, or by the waste liquids from mills, factories, &c. In this respect the author cannot but think that it is a wise course to tap rivers near their source for the supply of large towns, and not to rely on river water, as is the case in London, that has swallowed the sewage of a population of something like a million residing in 202 towns and villages.

Previous to 1806 this question had not received official attention, and it was left to chemists such as the late Dr. Letheby to study the question in connexion with sewage disposal works. In that year, however, owing to the complaints about the bad condition of some rivers becoming louder and louder, a Royal Commission was appointed to investigate the cause of river pollution, and to suggest remedies. It issued two valuable reports, and was succeeded in 1808 by a second Rivers Pollution Commission, which sat until 1874, and issued six lengthy reports. Since then this question has been repeatedly studied, both at home and abroad. Notable amongst these investigations are those made by the Massachusetts State Board of Health on the rivers within its territory, by the French Commission of 1871 on the Seine at Paris, by Brunner and Emmertich, 1874-75, and also by Franzitz, 1887-88 and 89, on the Isar at Munich; by Hulwa, 1877-81, on the Oder at Breslau; by Frank, on the Spree at Berlin, 1886-87; by Celli and Scala on the Tiber at Rome, 1890. The late Dr. Tidy has also gone very fully into this question, and read two elaborate papers in 1880 and '81 on this subject before the Chemical Society.

In order to give some idea of the composition of town sewage, the author has prepared a table in which he has compared the sewage of several European towns; the sewage of these towns does not vary very much from the average composition. In another table the sewage of water-closet towns and midden towns is compared, and there is not much difference between them. This has been done to disprove what is sometimes asserted, viz., that the whole difficulty of sewage purification would be practically non-existent were the faecal matters kept out of the sewers, and only the waste water from houses and the rain water carried away in them. A third table gives some analyses of waste liquids from mills and factories, from which it can be seen at a glance that these wastes are far more powerful sources of pollution than ordinary town sewage. The influence towns exert upon a river that flows through them can be learnt from another table. In the case of Bradford, for instance, the beck below the town contained in 1869 over ten times as much ammonia and organic carbon as it did above the town, and nearly five times as much organic nitrogen. In Leicester, too, the Soar below the town was, in August, 1884, seriously polluted, though not to the same extent as the Bradford beck. A great number of similar cases might be quoted, but the three stated will suffice to give some idea of the deterioration of river water in its passage through populous towns.

Tables V. to XXI. contain analyses of the following rivers:—

Table.	River.	Country.	Name of Analyst.
A.-V.	Thames	England	Rivers Pollution Commission
VI.	Ditto	"	Dr. P. F. Frankland
VII.	Mersey	"	Rivers Pollution Commission
VIII.	Irwell	"	Ditto
VIII.	Southern	"	Dr. Tidy
IX.	Severn	"	Ditto
X.	Shannon	"	Ditto
XI.	Ure	"	Dr. P. F. Frankland
XI.	Ona	"	Ditto
B.-XII.	Blackstone River	N. America	Massachusetts State Board of Health
XIII.	Charles River	"	Ditto
XIV.	Morfmack River	"	Ditto
XV.	Besver Dam	"	Ditto
XVI.	Brook	"	Ditto
C.-XVII.	Seine	France	Commission of 1874
XVIII.	Spree	Germany	Frank
XVIII.	Isar	"	Franzitz, &c.
XIX.	Elbe	"	Boasold, etc.
XX.	Oder	"	Hulwa
XXI.	Neue	"	Rejroth

It will be noticed that some of the rivers of which analyses are given have tidal portions, and it is necessary to state here that in the investigations for this paper these portions are not included. The reason of this is not far to seek, the conditions in the non-tidal portions being so different from those in the tidal portions that it is impossible to combine them in one set of investigations and to arrive at combined conclusions; and as the consideration of a non-tidal river is of far more general importance than that of a tidal one, the author only deals with the former class of rivers in this paper, leaving the examination of rivers that are tidal for a future occasion. It was not possible in all cases to give particulars concerning the velocity and discharge of the river under review, and the author regrets that sometimes elaborate analyses of a river at various points of its course are given without any attempt to convey some idea as to its discharge at these places, and as to the quantity of sewage that is poured into it. No definite conclusions can be arrived at without a full knowledge of these factors.

To judge of the state of any river it is usual to note its state as it appears to the naked eye, and to take samples of the water for chemical, microscopical, and lately also for biological examination. In the incipient stages of pollution it is difficult sometimes to detect it with the naked eye, but when the pollution has advanced further, the turbidity of the water, its colour, and smell are sure indications of it. The chemical examination should be carried out as soon as possible after the samples have been collected, otherwise further changes in the water will take place, and it cannot be said to express the various degrees of pollution so clearly as the biological one, which gives the germs per cubic centimetre. This can be seen very clearly from the analyses of the water of the Spree at Berlin, and of the Nehel near Guestrów. In the case of the Spree, for instance, the amount of oxygen consumed lies between 1.69 and 2.30 parts per 100,000, whereas the number of germs discovered ranges between 6,141 and 329,905 per per cubic centimetre. In this country it has not been customary up to the present time to examine water biologically, but on the Continent and in America the biological analysis now generally accompanies the chemical one.

The late Dr. Letheby stated before the Royal Commission on Water Supply in 1869 that he had made a very great number of chemical experiments to determine the self-purifying powers of our rivers and streams. He had also examined most of the rivers in England, and the conclusion he had come to was this, that if ordinary sewage containing, say, nearly 100 grains of solid matter per gallon, such as the London sewage, out of which probably something like 14 or 15 grains were organic, he mixed with twenty times its bulk of the ordinary river water, there would, after a flow of a dozen miles, be not a particle of that sewage discovered by any chemical process. The late Dr. Tidy, who at one time was assistant to Dr. Letheby, held very similar opinions, and, in a paper read some years ago at the Chemical Society, he stated that if organic be discharged into running water the sewage impurities would, after a flow of a few miles, be entirely destroyed or got rid of, the water once again assuming its normal condition of purity. He was of opinion that this power of self-purification depended on the subsidence of the suspended matters, on the presence of animal life in the river, and on the oxidation of the organic matter. The second Rivers Pollution Commission, after having investigated the case of the Irwell, Mersey, and Darwin, which were at the time the examination was made highly-polluted streams, and the case of the Thames, and after having made some laboratory experiments, came to conclusions somewhat opposed to those held by the late Drs. Letheby and Tidy; for whereas these two gentlemen were of opinion that both the suspended impurities as well as the dissolved organic matter,—the former by subsidence, the latter by oxidation,—were completely removed after a certain length of flow, the Commission held that though the flow of a river had a most material influence in the removal by subsidence of a large proportion of the suspended impurities both organic and mineral, especially if the flow was sluggish in places, yet the oxidation of the organic matter proceeded with extreme slow-

ness even when the sewage was mixed with a large volume of unpolluted water, and that it was impossible to say how far such water must flow before the sewage matter became thoroughly oxidised,—in fact, it would be safe to say that there was no river in the United Kingdom long enough to effect the destruction of sewage by oxidation. On the Continent of Europe the opinions on this question are very similarly divided. It was the author's privilege to take part last year in the deliberations of the German Association for the Promotion of Public Health, and he had the pleasure to listen to a long argument by the veteran German sanitarian, Prof. Dr. Pettenkofer, in favour of the total annihilation of sewage in river water when the amount of water in the river was never less than fifteen times that of the sewage, and the velocity of the former at least equal to that of the latter. The Prussian Government and that of several of the minor States appear to have been guided at first by considerations proceeding from views similar to those expressed by the Rivers Pollution Commission, but latterly a change of opinion in this respect is noticeable, and more weight is attached to the opinion of Prof. Pettenkofer.

It cannot, of course, be denied that almost any river some miles below the point where it has received polluting liquids looks fairly clarified again, the distance in each case depending mainly on the degree of dilution; but it does not follow by any means that the river has purified itself during this length of run. All those who are endeavouring to purify sewage either by artificial or natural means will know that there is practically not much difficulty in getting rid of the suspended matters, and that the main difficulty lies in the removal of the dissolved organic pollution. Of course there can be no such thing as self-purification if the organic pollution remains in the river, and it is with reference to this point that opinions differ so materially.

The author will not attempt here to give in full his examination into the rivers in various countries of which analyses are given in the appendix to his paper, as with the aid of the tables any member wishing to do so can follow this course. Suffice it to say that the whole of the rivers were examined and due consideration given to each case, and that the following conclusions were arrived at:—

1. That rivers possess self-purifying powers.
2. That these powers are in the main limited to the sedimentation of the suspended matters and germs.
3. That though rivers do possess the power to oxidise the organic matter in them, yet owing to this power being small the process is a slow one; and
4. That the distance over which the process of self-purification goes on depends chiefly on the velocity of the river and the quantity of water flowing in it (degree of dilution).

These conclusions should not, however, be taken as final, as there is undoubtedly a great deal of further information required before this subject can be considered to have been exhausted. It is necessary that all the public bodies charged with the care of our rivers and streams should make complete examinations of the rivers, &c., within their district, somewhat after the manner followed by the Massachusetts State Board of Health. Such examination should extend over the period of twelve months at least, and should comprise, besides careful chemical and biological examinations of both the water in the river at different points of its course, and the sewage and waste liquids which it receives, exhaustive inquiry into the drainage area of the river, its geological formation, its rainfall, its population, the velocity and the discharge of the river at the points selected throughout the year, and the amount of polluting liquids poured into it. Such investigations will at the same time afford valuable information concerning the question of the water supply to towns. In this respect the present Royal Commission on the Water Supply of the Metropolis is collecting valuable information concerning the Thames.

From the conclusions at which the author has arrived it will be seen that they lie somewhat midway between those expressed by the Rivers Pollution Commission and by the late Dr. Letheby.

There are undoubtedly rivers which purify the sewage within a very short distance, and there are others where the river cannot right

itself for miles. The former is the case where the degree of dilution is a very high one, *i.e.*, where the quantity of sewage is only a very small fraction of the flow in the river; the latter is the case where the sewage does not get much diluted by the river water. But wherever a river receives more sewage than it can deal with, it almost loses its power of self-purification.

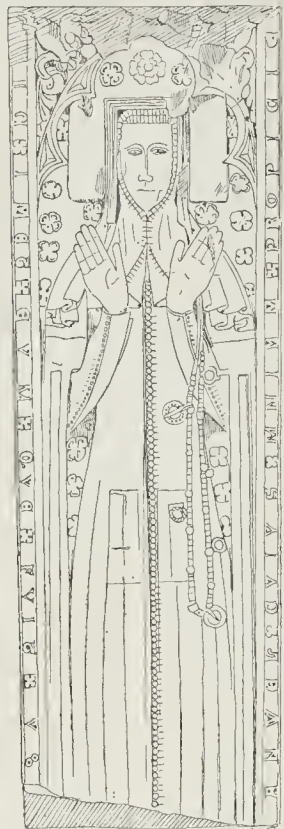
Prof. Pettenkofer proposes that the city of Munich should use the river Isar experimentally as a sewage farm. The drainage scheme for Munich was designed by the late Mr. Joseph Gordon in such a manner that the sewage, if required, can be applied on land without the aid of pumping. It is now proposed to establish a few roughing filters near the river to take out all floating matter, and then to let the raw sewage go into the Isar. If it can be proved at any time that such a course is fraught with danger to the river and the communities lower down its course, then the present outfall can be used as a storm overflow and the sewage treated on land. The population of Munich now amounts to 255,000, and when completely sewered the maximum flow of sewage will amount to about 35 cubic feet per second. The discharge of the Isar at low water is about 1,400 cubic feet per second, and its velocity at this time 4 ft. per second. In this instance the sewage amounts to 2.5 per cent. of the flow in the river at low water, and Prof. Pettenkofer, after having investigated the case thoroughly, is sanguine that no pollution will ensue in this particular case. It is quite impossible in the present state of our knowledge to lay down a general rule as to the degree of dilution which marks the boundary between the permissible and the non-permissible quantity of sewage, as this will have to be ascertained for each river in particular, the conditions varying in each case. It has already been stated that Prof. Pettenkofer is of opinion that if the sewage does never amount to more than one fifteenth, or 6.7 per cent. of the river water, and if the velocity of the latter is at least equal to that of the former, then raw sewage may be poured into such river without causing pollution.

In America, Mr. J. P. Stearns, Engineer to the Massachusetts State Board of Health, who has written a very able report on this subject, came to conclusions from which the author has deduced the following. If the sewage amounts to more than $\frac{1}{10}$, or 2.5 per cent. of the quantity of river water, it cannot be discharged into the river in its raw state; if it amounts to less than $\frac{1}{10}$, or 2.5 per cent., and more than $\frac{1}{20}$, or 0.8 per cent., it is doubtful whether it may be admitted; but when the sewage amounts to less than $\frac{1}{20}$, or 0.8 per cent. of the river water, then it may be admitted without any doubt in its raw state into the river. Stearns adds that these considerations are made from the "standpoint of the offensiveness of the water." From other standpoints, however, such as the use of water for certain manufacturing purposes, the amount of dilution should be greater; and in a stream used for domestic water supply it cannot be said, with our present knowledge, that any degree of dilution will make the water entirely safe for use.

In this country the results obtained from the discharge of raw sewage into the rivers have been very disastrous, the population of our towns being large, and the flow in the rivers small compared with the Continent and North America. After much careful consideration the late Commission on the Metropolitan Sewage Discharge came to the conclusion that in England it was not safe to turn even the effluent from chemical works into a running stream which did not carry twenty times more water than sewage.

The question of keeping our rivers pure and sweet is one fraught with many difficulties, which ever increase from year to year, and those who are responsible for their state have by no means an easy task both in this country and abroad; and as this is, in the author's opinion, an international question, he has thought it might be of some interest to this Association to have besides information from home, some from other parts of the globe bearing upon it.

THE NEW GUILDHALL, GLOUCESTER.—We are asked to mention that Elliott's patent "Simplex" weather-bar was used throughout to the easement windows of the new Gloucester Guildhall, the opening of which was recently chronicled in our columns.



Bangor Cathedral
Incised Sepulchral Slab
found in Lady Chapel



St Asaph's Cathedral



1. Slab in Nth Transept
2. Effigy in Sth Transept

Illustrations.

BANGOR AND ST. ASAPH CATHEDRALS.*

NEITHER of the two northern Welsh Cathedrals are conspicuous for their interest as episcopal fabrics, either in scale or detail. They are surpassed in both by many parish churches in England, and even in the Principality itself. The chief interest of Bangor lies in its plan, that of St. Asaph in its position, and in both will be found interesting monuments. Much as restoration has been abused,—and Bangor has come in for its share of abuse,—we owe much of the elucidation of its history to the repairs and partial rebuilding to which it was subjected under the direction of the late Sir Gilbert Scott. It was up to that time in a deplorable state, as were the other Cathedral establishments of Wales, and if we in these later days cannot always agree with all that has been done, we can and must at least bear tribute to the great care which was taken to found, as far as possible, the new work upon what had gone before, in preference to a new and original rebuilding, which could have been at that time of the Early Gothic revival hardly a success.

BANGOR.

Of the Norman Cathedral, destroyed during the wars of the Edwardian period, we have only one visible trace at present,—namely, a window and buttress on the south side of the presbytery. The restoration, however,

revealed to a greater extent the dimensions of the Norman building, and by reference to the ground plan here given,—which, with other information, has been kindly put at our disposal by Mr. J. Oldrid Scott,—it will be seen that the position of the central tower, the length of the transepts, and the lines of the presbytery and apse, were all determined.

The church which arose on the ruins of the Norman structure in the fourteenth century followed to a great extent the lines of its predecessor. The central tower was of similar dimensions,—the old foundations being used,—and the transepts and eastern arm lengthened. The original extent of the Norman nave is now uncertain. The fourteenth-century one had aisles, which the Norman one probably had not, and on the north side of the presbytery a chapel was built, equal in length with it, and approached both from it and the north transept. To Bishop Anian (1267-1305) is due this rebuilding, and of his church some considerable remains have been found. For in the troublous times of Owen Glendower the Cathedral was a second time attacked and almost entirely destroyed, and the vestiges of Anian's church which are now visible are due chiefly to the remains which were found during the restoration, and which have been taken as a guide for, and incorporated with, the new work of the transepts. The presbytery walls, the shell of the north chapel, and the aisle walls of the nave are largely Anian's work in all probability, although there seems some doubt as to the latter; but the jambs of the great windows of the transepts found during the restoration are of his time, and that on the northern side is especially worthy of notice for its detail,—simple but well pro-

portioned. On the east side of the south transept was an aisle or, perhaps, a sacristy, the foundations of which were unearthened, but which has not up to the present time been rebuilt. This south transept, the nave aisle wall, and the Norman window and buttress before alluded to, are shown in our view, taken from the south-east. It was not until the end of the fifteenth century, three parts of a century after its second destruction, that the fabric of Bangor was again taken in hand. To Bishops Deane and Skevington we owe the Perpendicular work in the presbytery and the nave and western tower. Deane's work is perhaps represented by the letter class of work at the east end of the presbytery, and the nave arcade, while his successor Skevington may be credited with the clearstory of the nave, and the windows of similar type on the south side of the choir. The west tower, over its western entrance, also bears the following inscription:—"Thomas Skevyn-ton, Episcopus Bangorie hoc campanile et ecclesiam fieri fecit a^o partus virginis 1532."

The Civil War left its mark on the fabric, and the modern fittings and absence of stained glass show how completely all that was of value had been destroyed. Of the period between the Civil War and the restoration by the late Sir G. G. Scott in 1866, perhaps the less said the better. It was a period during which the fabric was allowed to become degraded architecturally, and any interesting features of the sixteenth century that might otherwise have been preserved, gave place to the "excoriable gimcrack" to which Scott alluded in his report to the restoration committee. The interior was put into thorough repair; the aisles of the central tower and the transepts

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page xx.





HOLY WOMEN
PORTION OF A FRIEZE IN THE CHURCH
DESIGNED BY

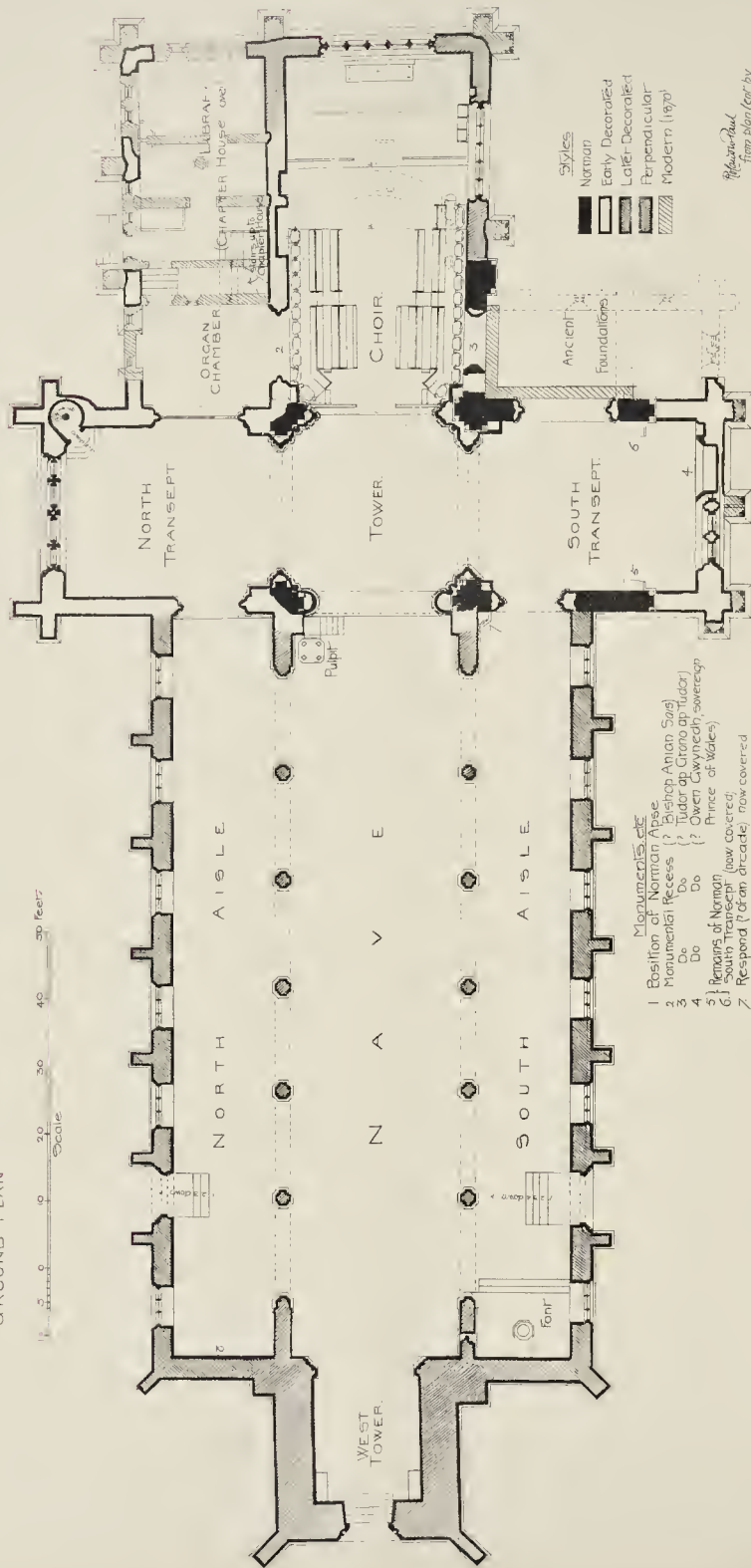
Royal Academy Exhibition, 1892.



OLD TESTAMENT:
THE ANNUNCIATION, CHISLEHURST
WESTLAKE.

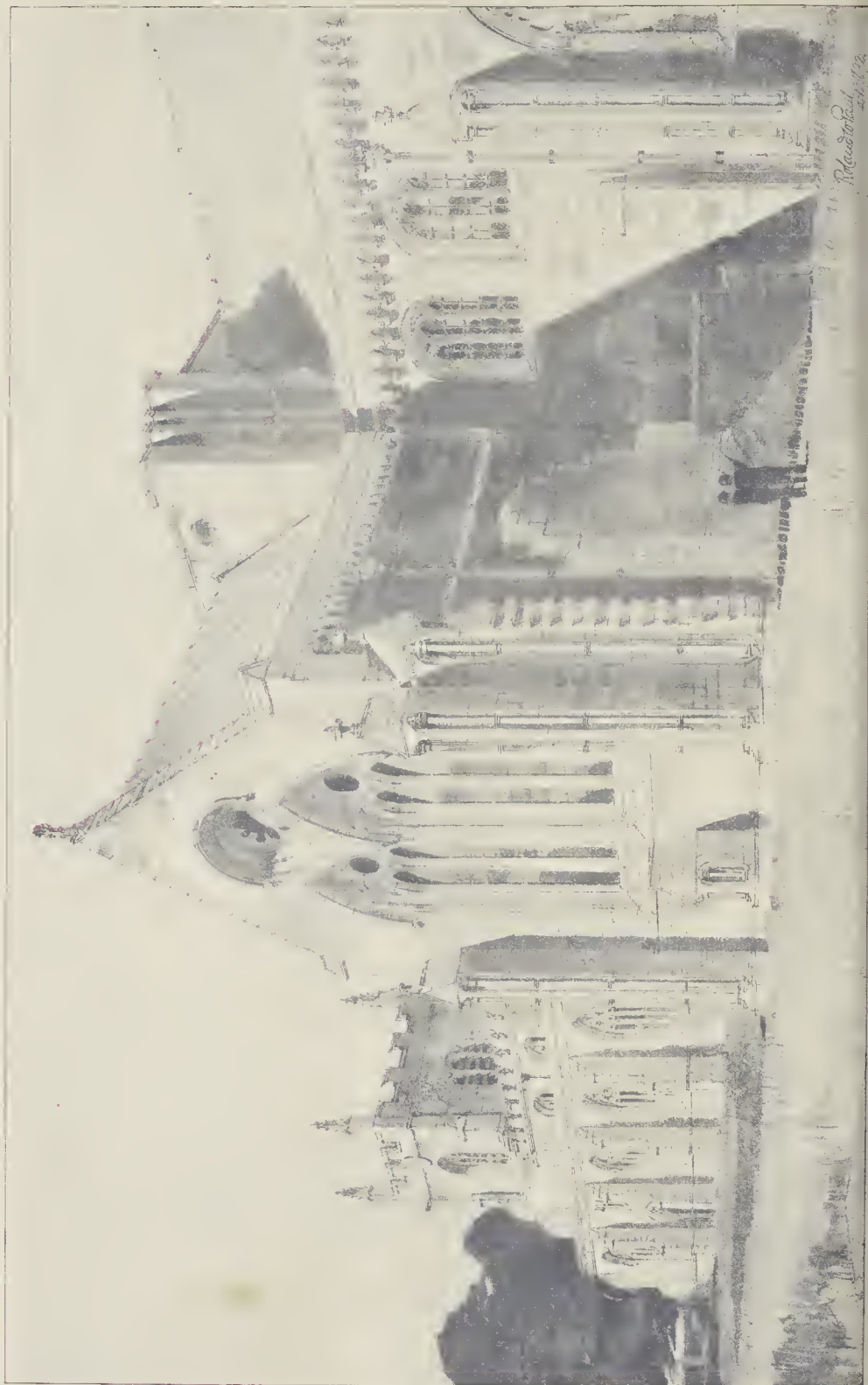


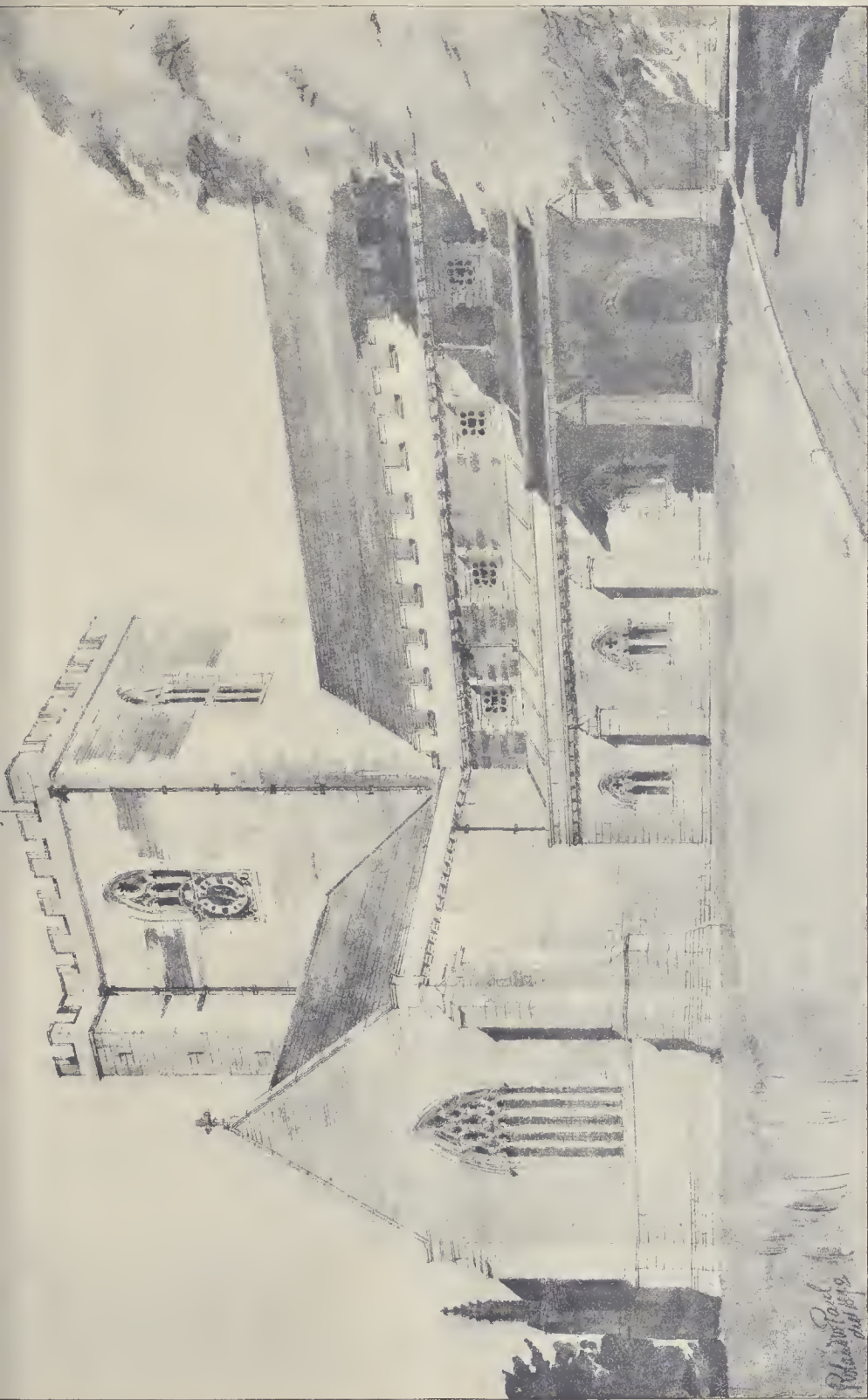
BANGOR CATHEDRAL
GROUND PLAN





THE BUILDER, SEPTEMBER 3, 1892.





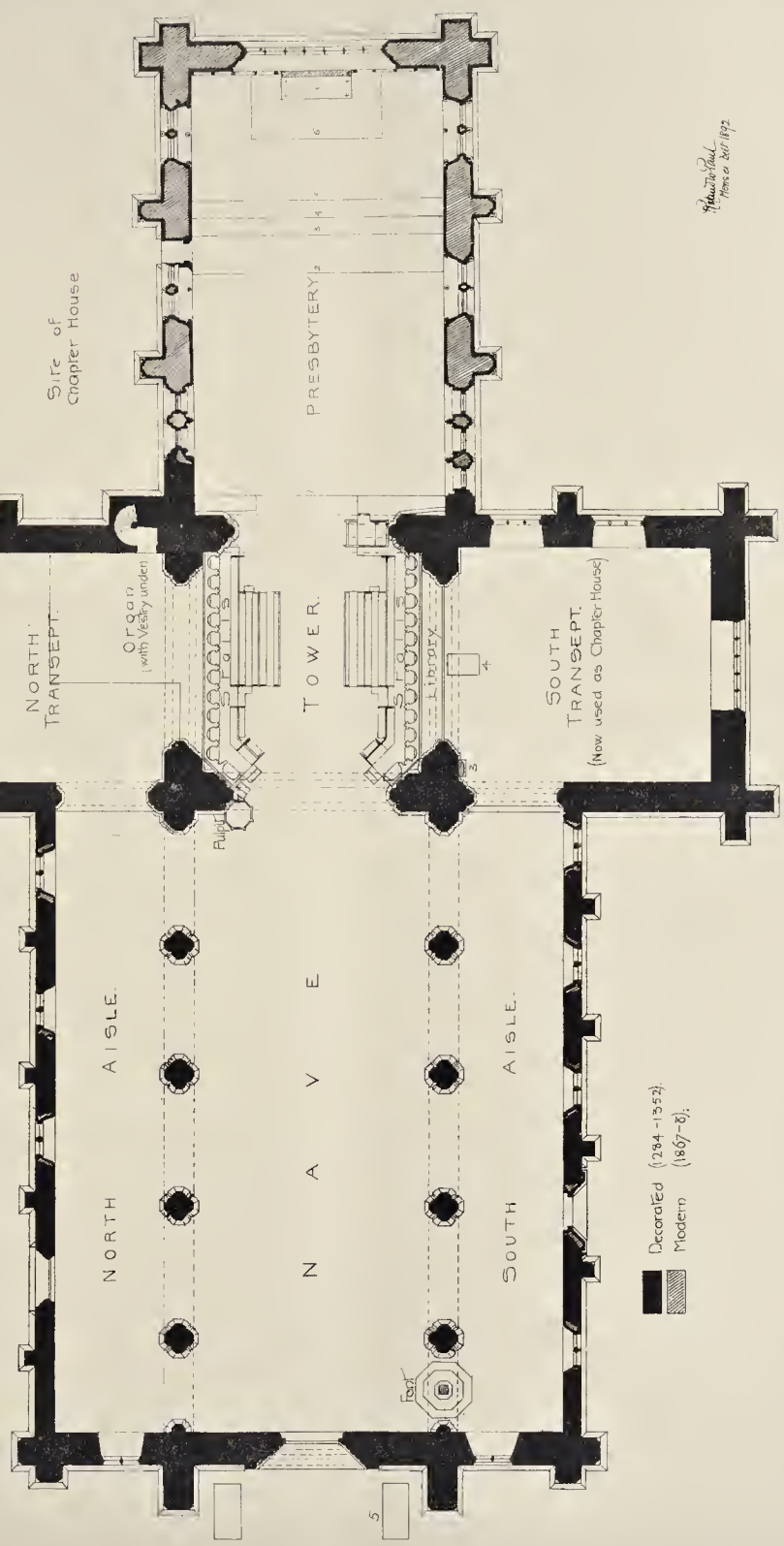
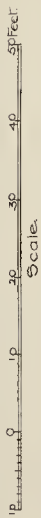
1/16 PHOTO SURQUAE & CO. 485 EAST MADISON STREET, CHICAGO, ILL. U.S.A.

Cathedrals of England and Wales.

No. 22. S. ASAPH: FROM THE NORTH-WEST.—DRAWN BY MR. ROLAND W. PAUL

ST ASAPH'S CATHEDRAL.

GROUND PLAN.



Decorated (1284-1352);
Modern (1867-8).

- Monuments
- 1 Incised Slab
 - 2 Unknown Monument 1856
 - 3 Unknown Slab (Ancient)
 - 4 Rectangular Slab
 - 5 Bishop Barrow (1670-1680)

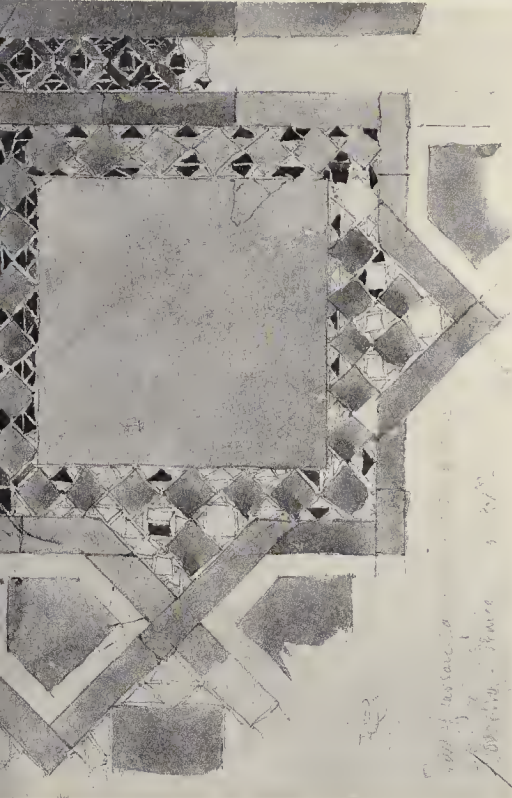
Site of Chapter House

*Photo by Paul
Hence at 201 1892*

PHOTO BY DR BRAGUE & CO 415 EAST HINDING STREET, PITTSBURGH, PA 15212

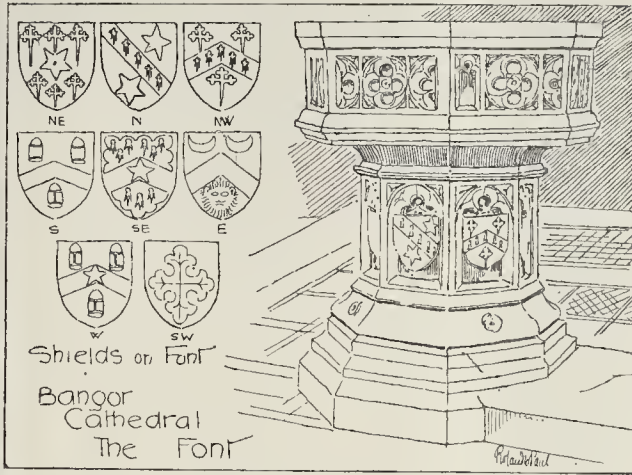




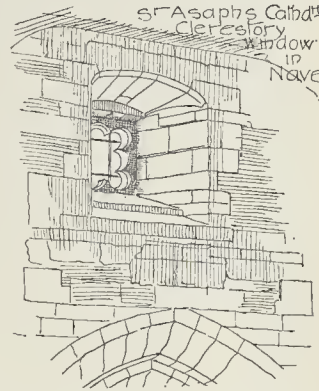


*Call of the stone
 1892. No. 3 572*

ING. PHOTO. SHARPE & CO. 48 & 50 EAST HAVING STREET, LONDON, E.C.



the simplest, merely consisting of a series of chamfered orders relieved with a wave moulding. This applies to tower arches, nave arches, and western doorway. The window tracery is reticulated in pattern in the transepts, with a more elaborate triplet, under an enclosing arch, at the west end. The side windows of the aisles are modern, but those at the west end are old, of two lights, with a quatrefoil in the head. Over the arcade is a clearstory of square



almost entirely rebuilt, the fragments of Anian's church being worked into the latter; and new stalls, pulpit, &c., took the place of the eighteenth-century excrescences. The stalls are placed in their old position east of the tower, the two three-light windows high up in the south wall (shown in our view) having been placed here in Perpendicular times to light the choir above the stallwork, while the eastern portion of the presbytery was lighted by a larger window of five lights placed at the more ordinary level.

The central tower, which, if rebuilt in the sixteenth century, was destroyed completely, has not been rebuilt, and it is doubtful whether the foundations would bear the additional weight. The dignity of the fabric would be much increased by this feature, Skevington's west tower being but a poor one for a cathedral church. After the detail of Anian's church the chief interest of the building lies in its interior. During the rebuilding of the aisle or chapel north of the choir, some interesting discoveries were made. It was found that there had been more than one floor, and fragments of these, including tiles of curious pattern with animals and birds incised, were unearthed, and are now to be seen at the west end of the north aisle, where they have been relaid in the floor. Standing against the wall near to them is a curious slab with an incised female effigy and inscription. It was discovered in the same portion of the building as the tiles, against the north wall of the chapel, and near its east end. It is composed apparently of a fine grey limestone, and bears the following fragmentary inscription in Lombardic characters:—
HIC · JACET · EVA · QVE · FVIT · VX · [OR] · ANWELL · CVJVS · ANIME · PROPICIT[UR] · (DEVS). The effigy is an interesting study in costume, and in good preservation. A rosary hangs over the left arm, and the head, resting on a pillow, lies under a cusped canopy, the carving in the spandrels being in the form of fleurs-de-lis. The space between the canopy and the pillow and shoulders is curiously powdered with four-leaved flowers, giving a much richer effect to the whole. The drawing of it here given is from a carefully-measured drawing made from the original. As it lay almost immediately north of the altar in the chapel, it must have commemorated some one of importance.

The two sepulchral arches on either side of the choir, shown on the plan, are now hidden by the stalls. The tomb in the south transept is of plain character, with a cross slab lying on the top, and a rough crucifixion built into the wall at the back. At the west end of the south aisle is the font, a good fifteenth century example, the panels of the shaft being elaborately decorated with various shields of arms, which are here given. Close by in the nave arcade are traces of an earlier respond. Another respond was discovered at the east end of the same arcade, and, though now covered, is shown on the plan, and points to the existence

* The slab measures in its present state 5 ft. 8 in. in length and 1 ft. 11 in. in breadth at the top, the bottom being 2 in. narrower.

of an earlier arcade than that at present existing.

ST. ASAPH.

The Cathedral of St. Asaph, although a slightly smaller building than Bangor, and the smallest of the Cathedrals of England and Wales, is finely situated on rising ground between the rivers Clwyd and Elwy. Of the four Welsh Cathedrals it is the only one built on an elevated site, and it derives a great deal of extra dignity from its position. No traces of an early building are to be found here, and the fabric as it stands now is, with the exception of the modern eastern arm, entirely the work of the Decorated period begun by Bishop Anian at the end of the thirteenth century, and probably completed in the early half of the fourteenth century. The early church was destroyed in 1282, and the only vestiges we have were found during the rebuilding of the chancel, and consisted of portions of the side walls and window jambs. They were of thirteenth-century date, and it is probable that on Anian's return to his See, after his excommunication, his rebuilding did not include the choir, but commenced at the transepts and tower. It will be noticed that the eastern arm is not central where it abuts on the tower, the distance between the north jamb of the eastern tower arch being less than that on the south. The centre of the east window is, however, central with the tower arch, so that but little deflection is noticeable in the interior. A chapter-house stood on the north side of the choir, and a door which probably led to it was found during the restoration. This building would correspond in position with the north chapel at Bangor (now used as chapter-room and library), and had an upper room. The general plan of Anian's church was extremely simple; aisleless transepts, a central tower, and a nave of

windows foliated, one window in each bay; old on the south, modern copies on the north. On examining them inside, it will be seen that the windows were originally of larger dimensions, the old marks of the sill being clearly visible (see sketch). In the north transept was an altar, in the south transept, which was the Lady-chapel, there were two. The north transept is now used partly as an organ-chamber and choir vestry, and the south is devoted to the uses of a chapter-house and library. In the centre rises the great central tower,—a massive bit of work, 40 ft. square, and, with the exception of the window tracery and the battlemented parapet, totally devoid of ornament. The stair turret is placed at the north-east angle. This central feature gives much additional dignity and completeness to the fabric, and increases the regret at the absence of a similar feature at Bangor.

Almost the only details of interest in the interior of the church are two monuments, of which we here give careful measured drawings. They were formerly on either side of the choir, near the east end, but were removed to the transepts when the eastern arm was rebuilt by Sir G. G. Scott. The first, a coffin-shaped slab, measuring over 7 ft. in length and 14 in. in thickness, lies in the north-east corner of the north transept. At the upper end is a shield bearing the arms *semé de fleurs-de-lis*, a lion rampant, and placed diagonally, passing under the shield, is a sword. The lower part of the slab is partially occupied by a hare chased by a hound, incised in a somewhat rude, if vigorous, style. In the south transept is a memorial of far higher artistic excellence, a figure of a bishop, finely executed, lying under a trefoiled cusped canopy flanked by pinnacles. It is somewhat remarkable in having had four angels, two with censers above the canopy, and two others guarding the pillow. The right hand of the effigy was held up in benediction, the left holding the crozier, but hands, crozier, and the heads and arms of the angels have been broken away. It is curious that the face has remained in such perfect condition, considering the evidences of past injury which the monument shows. It is generally supposed to represent either Bishop Anian or Llewelyn-ap-Ynyr (de Bromfield, his successor), and the details of the monument may very well be ascribed to that date. It is now in an erect position against the wall in the north-west corner of the south transept, where shown on plan, a good position for seeing it and for safety, but as a recumbent effigy its erect position is a little out of keeping. It should be restored to the choir, in which there is ample space.

The stalls are good late Perpendicular work of Bishop Redman's time (1471-1495), and have been added to and restored, together with a new throne and pulpit. The font retains portions of the old howl, but is otherwise modern.



five bays with aisles. The arches throughout have continuous impost, the moulding of the column being continued round the arches without a cap. The mouldings throughout are of

sary to support, with arches of this character, the required weights. As a result of the tidal experiments, it was found desirable to provide for the whole of the sewage being discharged in a period of one hour, this period commencing from an hour to an hour and a half after high water. That is to say, with the very slight head provided by the tank, the whole of its contents, namely $4\frac{1}{2}$ million gallons, had to be got rid of in sixty minutes. The outlet culvert, which extends crossways of the tank at the end farthest away from the sea, was therefore made as large as 6 ft. 6 in. by 5 ft., or roughly more than 30 square ft. in area. This culvert delivers into a small chamber from which three cast-iron outlet pipes, each 3 ft. 6 in. diameter of hors, were laid across the foreshore to below low-water mark.

Discharge Valves.—In order to avoid the necessity of employing very large valves, needing several men to work them, it was found imperative to provide each of the compartments of the tank with as many as three valves; so that, to deal with all the compartments, nine valves had to be worked. As the maximum time during which discharge should take place was one hour; it was obvious that only a few minutes could be afforded for the opening of these valves; for, allowing only the very modest time of five minutes for the opening of one valve, the whole of the nine would have required three-quarters of an hour; or, having regard to the shifting from valve to valve, more probably an hour; so that the last valve would not have been opened until the whole time at disposal for the emptying had elapsed.

Turbines.—After the first of these nine valves had been finished and tried at the factory, it became evident that some kind of motive power would be necessary for opening them. Many suggestions were made and considered. Finally a plan was proposed by Mr. Harris, now the writer's partner, which solved the whole difficulty. The principle upon which Mr. Harris's plan is based is that of making the sewage itself open the outlet valves. This is effected by gearing up each of the main valves to a small turbine. Each turbine is provided with a sluice 6 in. square, having a spindle carried up above the roof of the tank, finishing in a hand wheel. All that the tank attendant has to do when outlet time arrives, is to open in succession these nine turbine sluices. As soon as the turbine is in motion, the continuance of the revolution of the sluice spindle, by means of a screw upon it, puts an Addyman clutch into gear with the spindle of the main valve; and the turbine continuing to work rotates through wheel-gearing the spindle of the main valve, thereby lifting the valve. As the valve rises, it carries up with it a horizontal projecting plate, which, on reaching the top, closes the outlet from the bottom of the turbine, thus causing the turbine to cease work, and bringing it and the main valve quietly to rest. The result of this arrangement is that one man is able to open the whole of the nine valves in succession in something less than ten minutes, each of the valves being 4 ft. by 3 ft. 6 in., equal to an area of about 14 square feet. Some doubts were expressed as to whether this plan, which seems complicated in description, would work satisfactorily, having regard to the fact that sewage was to be operating liquid for the turbines; but the writer is glad to be able to say that from the time of opening the works until now no trouble at all has been experienced. Each turbine is surrounded by a galvanised iron screen, so as to prevent large "flotsam and jetsam" from interfering with the working of the gear. By means of these nine main valves, the outlet culvert, and the pipes, it is possible to empty the whole of the compartments of their contents in something like fifty minutes, or in less time than that shown by the tidal experiments to be necessary; and to do this at no greater cost than the wages of one attendant. For shutting down the valves there is ample time after the sewage has been discharged; the attendant readily closes them, which is a fairly easy operation, as their weight assists him.

Electrical Indicator.—The authorities desired to have the means of assuring themselves from day to day as to the time of tide when the discharge from the different compartments of the tank was commenced; and also as to the duration of the discharge. With the object of affording this information to them, and also to the men in charge of the pumping engines, an electrical indicator was fixed in the engine-

house, which, combined with clockwork, shows at every 6 in. depth the rate at which the tank is being filled, and then shows the time at which the discharge is commenced, and the duration of that discharge.

Outlet Pipes.—The fixing of the three cast-iron pipes laid across the fore-shore for the discharge of the sewage, was a work of great difficulty, and of some danger, owing to the swiftness of the tidal current, and to the exposed nature of the shore at this point. The mode adopted for securing the pipes is an extremely substantial one, consisting of a series of rows of screwed piles, carrying cross iron supports. The ends of the pipes are protected by a dolphin, constructed of strong wooden piles driven into the foreshore, and surmounted by a heacon, which is used for the purposes of navigation of the entrance channel. Prior to the erection of this dolphin, some fears had been expressed, based upon what had happened to previous dolphins at this place, as to the possibility of any structure being erected capable of withstanding the severe effects of winter storms; but the writer is glad to say that the six years which have elapsed since the dolphin was erected have passed without damage to it of any kind.

Groynes.—The banks of the channel being exposed to very heavy weather, and to the scour produced by the rapid flow of the tide, observation was made as to the effect upon the foreshore in times past; and it was found that in the neighbourhood there had been very considerable movements of shingle, sometimes by way of accretion, but also sometimes by way of removal, involving the destruction of a certain sea-wall work that had been carried out there. It was therefore necessary to resort to the use of groynes. These were simply constructed, consisting merely of rows of rough piles and planks: the piles in each row being about 6 ft. apart, while the row is placed at such an angle to the shore as was deemed most advisable. To these piles rough 3-in. deals were spiked, only one row in height being fixed at a time, and this was left until the shingle had collected behind it, when another row was added, and so on; and in this way thousands of tons of shingle have been collected at the back of the groynes to protect the works. It may be mentioned that the collection of shingle is an operation which cannot be hurried, and that any attempt to complete a groyne to the full height at once, on this coast at all events, frustrates the object; it must be done little by little.

Main from Pumping Station.—The height at which the storage tank was placed involved the connexion to it from the pumping station being under pressure; and this connexion was therefore made by a cast-iron pipe 3 ft. 6 in. diameter, laid to follow practically the surface-line of the ground through which it passed, and provided at the high parts with automatic air-outlet valves. This main is commanded by a stand-pipe in the engine-house premises. It is practically parallel with the old brick outfall sewer for the first 500 yards of its length; it then bends away to the north-east, passes round the moat of Fort Cumberland, and, approaching the tank at the north-west corner, is carried along its west wall, and is connected to the tank by three branches, 2 ft. 6 in. diameter, one in each compartment, each connexion being governed by a screw-down sluice-valve.

Pumping Engines.—The new pumping engines consist of two similar compound-cylinder beam-engines, manufactured by Messrs. James Watt & Co., of Soho, each competent to exert 150 indicated horse-power, with a boiler pressure of 80 lbs. on the square inch. The sewage pumps are arranged to receive the sewage from both the high and the low-level sewers, thus taking advantage of a portion of the sewage being delivered to the pumps at a higher level. The boilers are Lancashire boilers, also constructed by Messrs. James Watt & Co. The two separate cylinder engines, which had done all the work for the twenty years prior to 1887, have, since the new engines were put to work, been changed into a compound pair. Ordinarily one of the new engines in conjunction with the pair of old engines, or the two new engines by themselves, will suffice for the maximum work; thus giving a 50 per cent. stand-by of engine power, which can be employed when needed. The boilers of the old engines have also been thoroughly overhauled, repaired, and renewed where necessary. They

have been connected to the new boilers, and the steam and other piping have been so arranged that either engine, or pair of engines, can obtain its steam from any or from all the boilers. One of the engines at least is kept at work night and day, from year's end to year's end, thus continuously extracting the sewage from the sewers, and getting rid of it to the sewers, as it had previously done for hours together. The leading dimensions of the new engines are as follows:—

	Diameter.	Stroke.
	In.	ft. in.
High-pressure cylinder..	20	4 2
Low-pressure cylinder..	30	6 0
Sewage pumps, two in number to each engine and double acting..	30	3 8

According to the contract, the working speed of each engine was not to exceed twenty-four revolutions per minute; and at this speed, and with steam in the boilers at only 50 lbs. pressure per square inch above atmosphere, and when cutting off at half stroke in the high-pressure cylinder, each engine was to develop not less than 125 gross indicated horse-power. Each of the four sewage pumps is of sufficient capacity and strength to lift 250,000 gallons of sewage per hour, against a total head of 40 ft. In order that they should lift this quantity, even when they are somewhat worn, they were to be of such dimensions that, if there were no waste or leakage past the piston or valves at all, each pump should lift $7\frac{1}{2}$ per cent. more, or 268,750 gallons per hour. There are four Lancashire boilers, each 27 ft. 1 in. long by 7 ft. diameter, and each having two fire-tubes 2 ft. 8 in. diameter. Their working pressure is 60 lbs. per square inch above atmosphere.

Reconstruction of Sewers.—In addition to the outfall works, the sewers of the district generally were overhauled and repaired; and such modifications as were consistent with the system were made, with the object of increasing the rapidity of flow of the sewage, and of preventing flooding in times of heavy rain. A portion of the district of Southsea is upon bog land; there is no doubt that it was originally covered by the sea,—in fact, that a large portion of Southsea is merely reclaimed land. Many houses have had to be abandoned and left minihalled, owing to settlement. The sewers which existed in the streets in this area were found on examination to be broken-backed and out of level, and altogether in an extremely unsatisfactory state. It was felt that some means should be adopted for preventing, as far as the sewers were concerned, a recurrence of these evils; and it was found that, at depths varying from 10 ft. to 25 ft. below the road surface, there was solid gravel or shingle. A trench was sunk to the level of the intended underside of the concrete upon which the sewers were to be carried; and wooden piles were driven down in this trench until they were well into the gravel. The heads of the piles were cut off level with the bottom of the trench, and rolled iron joists were bedded upon them, thus bridging the distances from pile to pile. Upon the joists polling boards were laid transversely; and upon these polling boards was placed the concrete, upon which the sewers were bedded. The sewer was then put in upon the concrete, the trench filled in, and the road surface made good. This construction has no doubt somewhat expensive, but time has proved that the expense was fully justified. The sewers, on a recent examination, were found to be perfect in line and joint throughout, and this mode of construction has since been adopted for other portions of the town, where similar difficulties had to be contended with.

The whole of the new works were carried out without disturbance of those already in existence; and these with the system of sewage discharge in use prior to 1887 were maintained until the present outfall works were put into operation. They were completed in 1887, Alderman Sir William King, the then Mayor, presiding over the opening ceremony, which took place on May 9 in that year.

SURVEYORSHIP, BERMONDSEY.—Mr. Frank Sumner, from the office of the Willesden Local Board, has recently been elected Surveyor to the Vestry of Bermondsey, to fill the vacancy caused by the resignation of Mr. Geo. Elkington.

COMPETITIONS.

NORTHAMPTON INSTITUTE, CLERKENWELL.—This is a building, to be erected under the auspices of the governing body of the City Polytechnic, on a site given by the Marquess of Northampton, for which six architects are to be invited to submit designs, who will be paid a fee of 40*l.* each. The names of the six competitors are not yet finally settled. The conditions of competition have been drawn up by Mr. Chas. Barry, who will act as professional assessor. The designs are to be sent in on December 1 of this year.

MANCHESTER NEW TECHNICAL SCHOOL.—In connexion with the competition for the erection of the above building, the Technical Instruction Committee of the Manchester Corporation report that in response to their advertisement they received in competition twenty-six sets of designs. It was deemed advisable to obtain the assistance of Mr. Alfred Waterhouse, R.A., as assessor. The designs were hung for inspection in a large room in the School of Art, where Mr. Waterhouse began his labours on August 22. At the end of last week the committee inspected the plans, in company with their adviser. After much deliberation the designs which were considered to be entitled to first, second, third, and fourth premiums respectively were selected. The sealed envelope containing the name of the successful competitor will not be opened until the confirmation of the committee's proceedings by the Council.

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ARCHITECTURE.

SIR,—In the history of institutions as well as individuals there would seem to come a time of crisis, which, if taken advantage of, may issue in increased vitality.

To such a critical period the R.I.B.A. has arrived. It has done good work in the past by opposing abuses,—raising the character of the architect and of the surveyor,—encouraging students by offering good prizes for competition, &c., and in founding a library of great value and importance.

This is a work which could only have been accomplished by men of a certain stamp and energy. They probably made a mistake when they called it an Institute of "Architects," for it would more correctly be defined as an Institute of Architects and of Surveyors, &c. As it is, the proportion of architects to surveyors is small; and when the former exhibit any anxiety that architecture should be adequately represented, they are repressed, and dubbed by that most objectionable title, "Art-Architect."

Architecture as a "fine art" is, perhaps, little understood, and is very generally regarded as something to be applied to a building; whereas architecture deals with, and stamps with its impress, all the process of building, beginning with plan, elevation, and section, which are of equal value in the development of architectural character, and ending with the right treatment of the several materials employed in the construction of the building.

An iron girder, for instance, treated architecturally, should differ from the mere product of the engineer's method. And in the use of marble, stone, or wood, there is a treatment for each which should express the character of the material, and the forms suitable for one material should not be used interchangeably with another.

To give a definition of all that goes to produce "architecture" is difficult. It is obvious that all building is not architecture, neither is building *plus* ornament, or decorative features, architecture. Architecture does not deal with exceptional kinds of building, but deals with ordinary building in an exceptional way. Again, the difference between building and architecture is not primarily a question of form, though form has much to do with it, as that which applies to the outward thing, but architecture possesses also an inward quality, expression, and character, which engenders in the beholder emotion which responds to the sense of fitness.

The subtle and living attributes are recognised by the artist, and run through the whole gamut of art, and it is these qualities which alike distinguish real sculpture and painting from mere imitations and lifeless work.

In the memorable case of "Belt v. Lawes," the judge, jury, and the majority of the public,

failed to see that the mere appearance of the likeness of a thing did not constitute the art of sculpture, or raise the work above that which a cast of the object could represent even more accurately; and the Royal Academicians were quite unable to put into language, which the legal mind could compass, any definition of the distinguishing characteristics of real and fictitious art. A good work of art is known and recognised as such at all periods, though it may not be publicly acknowledged until years of neglect have passed over it, until, in fact, the opinions of those who have eyes to see, and capacity to judge, have accumulated with sufficient force and weight to mark it as something to be admired. The theory that good work is affected by fashions and taste is a mistaken one, yet it is quite true that with the ignorant the prevailing fashion may form the standard of acceptance or rejection.

An architect must be an artist, or he has no right to the title. A man may be a good builder, a surveyor, an estate-agent, or sanitary engineer, but Art is so jealous a mistress that it is very unlikely he will be an architect also.

At the present time the Institute has an opportunity to put itself in the right with regard to these matters, for it has under consideration the qualification of its "Fellows."

Surely the qualification for Fellowship should not be the quantity, but the quality of the actual work done by the candidate. Nothing else can make the title of "Fellow" worth anything.

It is admitted that there can be no examination in art, and architecture is an art. You can have the science without art, but you cannot have the art without the science, and where one begins or the other ends it is impossible to say.

No amount of examination can make a man an architect. Examination of students is well and good, but here again the Institute might with advantage cease to use the title "Examination in Architecture," as being incongruous. It is true that an artist, if he is to exercise his art aright, should he taught building construction, the strength of materials, the capacities and limitations of the several materials at his command; also sanitation, and the practice and methods employed by the several crafts in connexion with his work as an architect, and in all of these things the student can be examined.

It is not that the present Institute Examinations in any way intend to undervalue or underestimate the importance of what is called the "art side," but it is this very division of art and science in architecture which is injurious and misleading, especially when it is entitled an "Examination in Architecture" which comprises both. If this title were altered it would meet the objections which, with justice, are raised against these Institute Examinations, and go far towards healing the present breach; and if the title of "Fellow" can be made a distinction and not a superior qualification to practice, a still further division may be prevented, for there can be no doubt that,—

"There is a rift within the lute
Which by and by will make the music mute."

JOHN BELCHER.

20, Hanover-square, W.

LONDON WATER SUPPLY.

SIR,—Referring to your "Note" in connexion with a double supply, and Mr. Richardson's letter to the *Times*, while agreeing with you in the opinion that there would be many difficulties in the way of two distinct supplies to every house, I think it would be quite practicable to reserve a supply of pure water (when obtained) for domestic and other purposes for which it is indispensable, and using a supply obtained from the Thames and Lea for those purposes not requiring water of a high standard of purity,—such as street watering, fire extinction, flushing of sewers, and the washing of carriages, stables, yards, &c.

This latter supply could be pumped into mains direct without any filtration.

The provision of a duplicate system of mains would not appear to be such a very costly undertaking, as many of the thoroughfares are at present supplied with double mains.

Were this system adopted, a much less voluminous supply of pure water would be sufficient for the needs of London.

It would not do, however, to take this impure supply into private houses, as, apart from all other considerations, it would be very liable to be used for drinking and cooking purposes, owing to carelessness or a temporary cessation of the purer supply, and much danger would therefore arise.

I may say I wrote with this suggestion to the *Times* a day before Mr. Richardson's letter appeared, but I suppose a non-technical editor could not discriminate between my suggestion and

the other,—although materially different,—and so considered its publication unnecessary.

HARRY G. ASSITER.

LATER SCOTCH CASTLES.

SIR,—I observe in your appreciative article (for which I am indebted) on the above (*Builder*, August 6) that you state that the part of the book relating to town houses and churches seems rather like padding, and is out of keeping with the rest of the work.

But I hope you will allow me to remind you that the book professes to treat of the domestic architecture of Scotland as well as the castellated, and it appears to me that without some notice of the town houses it would have been not only incomplete, but would have left out a very important chapter of the subject. With regard to the churches, the towers of certain of them were practically castles, and were used as such, and the resemblance of them all in their style to the castellated and domestic architecture of the country was, I think, well worth pointing out in a book of this nature, and to be quite within the scope of the undertaking.

With regard to the Scotch sun-dials and their amount of practical use as compared with English ones, I grant them to be entirely useless adjuncts to a railway station; but in a garden where one has leisure, it is rather interesting to watch the shadows moving about the complicated surfaces of such a sun-dial; these all telling the same story in a silent manner seems to be quite in keeping with the ideas of such a place, and at the same time furnishing the mind with a little *gentle* curiosity.

Where can one see illustrations of those beautiful English sun-dials to which your article refers so enthusiastically? I have long wished to be able to compare the sun-dials of Scotland with those of other countries, but have not been able to see any collection of plates to enable this to be done.

Edinburgh, Aug. 26, 1892. THOMAS ROSS.

* * * The point of our comment was that, whereas Scotch castellated architecture was treated as far as possible completely and exhaustively, domestic and city architecture were only treated briefly and incompletely, producing a book complete on one side and incomplete on the other, which was to be regretted; and that the book would have been still more satisfactory if it had been confined to a complete treatment of one class of buildings. In regard to sun-dials, we are not aware that there is any complete illustrative work on English sun-dials; it would be quite worth doing. We admit the "gentle curiosity" stimulated by the favourite Scotch form of sun-dial; our complaint is that they are, in a decorative sense, unpleasing and ungraceful objects, while the English sun-dial is nearly always graceful.

—Ed.

"THE BUILDER AND THE ARCHITECT."

SIR,—Do not be too hard on Mr. *Punch*. I have known and loved "The Walrus and the Carpenter" since its publication some twenty years ago; and I think the verses in last week's *Punch* are worthy of preservation as a successful parody. Surely it is true that architects do act, for, or with, builders in the covering of estates, though not, one hopes, with the dreadful consequences described. There is generally some exaggeration in satire, and, personally, I am charmed with the poem, which I mean to keep as a warning to the offices.

R. LANGTON COLE.

* * * We admit the literary merit of the parody, but our opinion as to the justice of the satire is unaltered. Architects do not act with or for that kind of builder.

The Student's Column.

CONCRETE.—X.

ARTIFICIAL CEMENTS (continued).

PORTLAND: SAND TEST.

ALTHOUGH the testing of cement neat is undoubtedly important, it does not really give us an exact idea of the working value of the cement; for cement is scarcely ever used neat, but almost invariably in combination with sand and other substances. This is one strong argument in favour of testing briquettes composed of cement and sand, so that the test may bear a closer relation to the uses to which the cement must be put in actual construction. Another argument, even more forcible, is that the strength of neat cement does not bear a fixed ratio to the strength of the cement when mixed with sand, and many figures might be quoted to show that, of two cements, one gives better results when tested neat, while the other is the stronger when tested with sand. The German and Austrian standard rules prescribe such a sand-test; they require the briquettes to be composed of one part cement and three parts dry sand (by weight), to remain in air for one day after gauging, and then to be placed in water for

a period of twenty-seven days; at the end of this period they are to be tested. The German rules in 1878 required the tensile strength of such briquettes to be 10 kilograms per square centimetre (142.22 lbs. per square inch); while the Austrian rules demanded 12 kilos. for the same area (170.7 lbs. per square inch). In 1887 the German standard was raised to 222.5 lbs. per square inch. Some German makers guarantee the minimum tensile strength of briquettes, made with their cement according to the standard regulations, to be 16 kilos, per square centimetre, or 227.5 lbs. per square inch. Thirty-three briquettes made from Messrs. G. & T. Earle's Portland cement and three parts sand, in accordance with the German rules, were tested by Mr. Faija in 1886, and gave an average strength of 251 lbs. per square inch at twenty-eight days. Dr. Michalis mentions one cement which, tested with three parts sand, broke with 457 lbs. per square inch at twenty-eight days.

There are two common objections raised against the sand-test; first, the great delay which a test extending over twenty-eight days involves (and briquettes containing sand, it must be remembered, cannot be fairly tested at an earlier date); and second, the difficulty, nay, almost the impossibility, of obtaining natural sand of such an uniform physical and chemical composition as will give always identical results. In Germany, a standard sand can be obtained from the Government testing-establishment at Berlin; this sand has all passed a sieve with 357 meshes per square inch, and has all been retained on one with 774 meshes in the same area. The second objection, therefore, loses in that country a great part of its force. But in England no such standard-sand exists, but any kind of sand, apparently, has been used, the only care being that the grains are of a certain size, usually such as have passed a sieve with 400 meshes to the square inch, and have been held by one with 900. Mr. Grant, however, the great advocate of testing cement with sand, declared in 1880 that he had "recently met with two sands which, though both clean, sifted through the same sieves, and not much unlike each other even under the microscope, gave results that differed by 50 per cent. From this," he continued, "it was clearly as important to test the quality of the sand or gravel used with cement as it was to test the cement itself." This would be multiplying the difficulties of testing, and therefore we think Mr. Faija's suggestion, made after the reading of Mr. Grant's paper, a good one, namely, that cement should be tested neat, and that for the sand-test the sand used should be of the kind which would be used in the actual works for which the cement was required. This would give the architect or engineer a knowledge of the strength to which the particular structure about to be erected might be expected to attain. In Table ii. of the third of this series of articles (see *Builder*, p. 56, ante) will be found the result of tests by Mr. Grant on the strength of neat cement, and of cement and sand in different proportions.

A brief outline of the method of testing for tensile strength has been given in the eighth of this series of articles (see *Builder*, p. 153, ante), and the effect of the time of setting, &c., upon the tests will be considered hereafter.

Compressive Strength.—Testing by compression is seldom or never specified, but the results of such tests, especially with briquettes of cement and sand, are of interest, as such a test approximates more closely to the actual stress which the cement has to bear in certain parts of a building (foundations and arches, for instance), than does the test by tension. The shape of the briquettes largely influences the results, as it does in the case of tensile-tests. The resistance of cubes, columns, cylinders, &c., as can easily be understood, varies considerably. For comparison, cubes of a certain size would be most convenient.

The resistance which Portland cement offers to compression bears an approximate relation to that which it offers to tension, although the relation is not as uniform as in cast-iron and wrought-iron. Messrs. Dyckerhoff found that cements, tested under the same conditions as to area, &c., and with three parts of sand to one of cement, exhibited a resistance to compression twenty times as great as that which offered to tension, but this apparently is an abnormal ratio. Professor Dauschinger states that with nine cements the ratio between compressive

and tensile strengths varied from 7 to 1 to 11 to 1. On the Continent it is usually considered that the resistance of a cement to compression should be ten times as great as its resistance to tension. Mr. Faija found that four cements gave results in which the ratio varied from about 7 to 1 to 9 to 1; at the age of 28 days, the resistance to crushing varied from 4,270 lbs. to 4,780 lbs. per square inch, and the resistance to tension from 480 lbs. to 696 lbs. These figures are the average of three tests in each instance; the briquettes crushed were only 1 in. cubes.

Considerable objection has been taken to the equality of the surfaces of the briquette may cause fracture under a comparatively small stress. This is perfectly true when the briquettes are very small, but the difficulty is not insurmountable. If, instead of 1-in. cubes, 6-in. cubes were made, and brought to a smooth surface on two opposite sides with plaster of Paris, or in other suitable manner, and crushed, as in the case of building-stones, more accurate and uniform results of considerable value would be obtained. When the resistance of building-stones to crushing began to be tested, small cubes measuring 1 in. or 1½ in. or 2 in. each way were used, but the results varied to such an extent on account of the irregularity, &c., of the specimens that it was found necessary to test larger pieces. This was rendered possible by Kirkaldy's powerful machines. The larger pieces invariably gave higher results per square inch than the smaller; thus, nine experiments on 2-in. cubes of Yorkshire stone gave a mean resistance of 438 tons per square inch, while 6-in. cubes gave a mean of 431 tons; and 2-in. cubes of Bath stone (Dons) crushed with 86 ton per square inch, while 6-in. cubes required 1.5 tons per square inch to crush them. Mr. Faija's tests of 1-in. cubes of neat cement showed compressive strengths varying from 191 tons to 213 tons

These tests were all made on briquettes twenty-eight days old, the first four series having been kept in air one day and in water twenty-seven days, the last three series having been in air the whole time. The briquettes were very small, those subjected to tensile stress weighing about 33 lbs. each, and the others about 43 lbs. each.

Transverse Strength.—Mr. D. A. Stevenson specifies the following test of cement for small works, where a testing-machine cannot reasonably be required:—"The cement is to be made into blocks, 1 in. square and 8 in. long; these are to be immersed in water for seven days, and then tested by being placed on two supports 6 in. apart, when they must stand the transverse strain produced by a weight of 75 lbs. placed in the centre."

Mr. Deacon, Water Engineer of Liverpool, contrived a simple apparatus for ascertaining the transverse strength of cement bars, by which no stress is put upon the bar by the weights until a lever is moved. He recommends that three bars of neat cement, 10 in. by 1½ in. by 1½ in., be made, kept in water for seven days, and then broken on supports 9 in. apart; if not more than one of the three break with a weight of 150 lbs., the cement may be considered satisfactory.

For use in the formula $C = \frac{3LW}{2BD^2}$ Mr. Stevenson's test assumes the value of C to be 675, and Mr. Deacon's assumes it to be 633; these constants will give the breaking-weight (W) in lbs. Calculations will be much simplified if C be taken to equal six, the breaking-weight being then in cwt.; this will be near enough for all practical purposes, for a large factor of safety must always be used in calculating the safe load for concrete structures.

The following table has been compiled from figures given by Gillmore in his "book on Lines, &c." The bars were made in 1860, kept in water, and broken by a force applied at the middle, the ends being simply supported:—

TABLE XIV.
Transverse Strength of Portland Cement.

Proportion by volume.	Size of bars.	Clear span.	Age in days.	Average breaking weight in lbs.	Value of C to give result in cwt.	Remarks.
English Portland cement	in. in.	2 × 2	4	320	1,536	10.3
1 " to 1 sand	" "	" "	" "	" "	1,263	8.4
English Portland cement	1 × 1	" "	" "	" "	950	6.3
1 " to 1 sand	" "	" "	" "	" "	308	12.3
1 " " 2 " "	" "	" "	" "	" "	313	12.6
1 " " 3 " "	" "	" "	" "	" "	204	8.2
1 " " 4 " "	" "	" "	" "	" "	91	3.6
1 " " 5 " "	" "	" "	" "	" "	74	2.9
1 " " 5 " "	" "	" "	" "	" "	45	1.8
1 Roman cement to 1 sand	2 × 2	4	100	585	3.9	Set under pressure of 32 lbs. per sq. in.

per square inch at the age of twenty-eight days, and increasing to three or four tons at the end of six months. Some tests by Mr. A. E. Carey showed the compressive strength of a neat cement to be at three months 7,392 lbs. per square inch, or 3.3 tons. Tests of larger concrete cubes will be given hereafter.

The following table is based on results obtained by Messrs. Dyckerhoff, and shows the relation between the tensile and compressive strengths of cement mortar containing sand and lime in varying proportions; the sand had all passed a sieve with 387 meshes to the square inch, and had all been retained on one with 774 meshes; the cement took four-and-a-half hours to set:—

It will be noticed that the value of C deduced from these experiments is considerably more than is required by the tests of Mr. Stevenson and Mr. Deacon, but it must be remembered that the latter are for tests at seven days, whereas Gillmore's experiments are on bars 270 and 320 days old. The abnormal ratio of the first three tests in the second series seems to point to some error or irregularity in the testing.

OBITUARY.

MR. PHILIP HERAPATH, F.R.I.B.A.—Mr. Philip Herapath, of Auckland, New Zealand, died on June 29 last, after a brief illness. He was elected a Fellow of the Institute in 1886.

* Proceedings Inst. C.E., vol. lxxviii, pt. 1.

TABLE XIII.
Tensile and Compressive Strength of Portland Cement.

Cement.	Composition of briquettes by weight.		Tensile strength in lbs. per sq. inch.					Compressive strength in lbs. per sq. inch.				
	Lime in Dry State.	Sand.	Three of Sand.	Five of Sand.	Six of Sand.	Seven of Sand.	Eight of Sand.	Three of Sand.	Five of Sand.	Six of Sand.	Seven of Sand.	Eight of Sand.
1	...	3, 5, 6	224.8	138	91	...	...	4,822	2,341	1,549	...	...
1	...	3, 5	236.2	159.4	...	...	...	5,509	3,036	...	...	...
1	...	3, 5, 6	258.9	159.3	145.1	...	...	6,202	3,393	2,501	...	...
1	...	5, 6, 7	...	139.4	132.3	119.5	...	...	3,618	2,381	2,066	...
1	...	5, 6, 7, 8	...	128	137.7	80.6	86.8	...	3,412	2,719	1,941	1,613
1	...	6, 7, 8	...	...	115.2	91.1	74	...	...	3,521	2,535	1,847
1	1	8	...	...	...	...	76.3	...	...	...	...	1,871

* Proceedings of the Inst. C.E., 1870-80, part iv.

GENERAL BUILDING NEWS.

WARD'S SCHOOL FOR GIRLS, LONDON.—Mr. Andrew Murray, Surveyor to the City of London, has prepared some alternative plans and designs for a school which the Corporation are about to establish under provisions of the will of the late Mr. Ward. Having agreed upon one set, the Corporation will cause the new school to be erected upon a site next to the Guildhall School of Music, on the Victoria Embankment. It is hoped that room can be provided there for 400 pupils. It is stated that Mr. Murray's accepted design is in the Gothic style, and that the estimated cost is 15,400*l.*, with 2,000*l.* for the furniture and fittings.

NEW CHURCH, RATHMULLIN, DONEGAL, IRELAND.—On the 23rd ult. the new Church of St. Joseph, Rathmullin, was dedicated by the Bishop of the diocese, the Rev. Dr. O'Donnell. The site of the church is on the face of a hill overlooking the pier and the lough. The church is designed in the Gothic style of the thirteenth century, and consists of nave, chancel, and sacristy. The nave measures 70 ft. by 30 ft., and the apse is 21 ft. in depth, and of octagonal form. The side walls are pierced by single lancet lights, of which there are five on each side, and the apse is lighted by five windows in the sides and end. The west end has a triplet, of which the centre one has a niche for a statue of St. Joseph, to whom the church is dedicated. The flanking windows of the niche show above the organ gallery, and are surmounted by a circular cusped rose-window. Buttresses are introduced, and these, as also the doors and windows, are all finished, as Mount Charles cut stone. The roofs are high-pitched, with wrought principals and boarded ceilings, divided into panels by mouldings, the apse ceiling being treated with mouldings, and the whole varnished. The floors are of timber, and provision is made for three altars, those already erected being of timber. The church was designed by and carried out from the plans of Mr. Wm. Hagno, architect, Dublin, and the builder has been Mr. James M. Clay, Strabane.

FREE LIBRARY, KIDDERMINSTER.—For the erection of the Free Library, in Exchange-street, Kidderminster, for the Corporation, the tender of Mr. Henry Smith, of Kidderminster, has been accepted, and the work commenced. Mr. Tomkinson, High Sheriff of Worcestershire, who is Chairman of the Free Library Committee, has consented to lay the foundation-stone. Mr. J. M. Gething, of Kidderminster, is the architect.

ADDITIONS TO GLASGOW POST OFFICE.—According to the *Scotsman*, the extensive additions which are being made to the General Post Office, Glasgow, at a cost of 30,000*l.*, are expected to be completed in the course of the next eighteen months. By securing the site of the old Athenaeum, at the hack of the present office, sufficient area has been provided almost to double, roughly speaking, the accommodation of the different departments, barring the public offices, which remain unaltered. The present building, in fact, is not in any way interfered with, except in so far as is necessary to connect it with the new structure in the rear. Having its front elevation towards Ingram-street, it has not been necessary to adhere to the original style of architecture, and the architect, Mr. W. W. Robertson, of Her Majesty's Buildings, has adopted a Renaissance style. Of the extensions, the main feature, according to the plans, is the provision of three large rooms, each occupying the whole extent of one of the floors. On the ground floor there will be a new sorting-room, 128 ft. by 80 ft. in its internal dimensions, and connected with the old sorting room, which is on the corresponding flat of the present office. Above, on the first floor, and of the same dimensions, is a new letter-carrier's room, and over it again is the telegraph-room, with large roof-lights in addition to the windows. All of these departments are similar in size, and the floor space, save for half a dozen supporting columns, is uninterrupted. The basement is taken up with the engine-room and the boiler-house required for the working of the pneumatic tubes, and the supply of the electric light, with which the entire office will be illuminated. In the basement also accommodation is found for the telegraph delivery-room and the telegraph messengers' kitchen. On either side of the building a covered way is to be constructed to enable the mail-carts to enter. The contractors are Messrs. McKessock & Son, Glasgow, and Messrs. Morrison & Mason, Glasgow.

VILLAGE HALL, FOREST-RROW, SUSSEX.—A village hall has just been erected at Forest-row, Sussex, by Mr. H. R. Freshfield, to the memory of the only grandson of Mr. and Mrs. Freshfield. The architect of the building is Mr. J. M. Brydon, of Regent's Park, London, the builder being Mr. John Luxford. The exterior of the large hall is constructed of orange-red bricks from Winley Forest, Backwell, with cornices of local sandstone, and the heavy buttresses are also constructed with it. The lower portion of the front of the building and its two wings is of local stone, the upper part being covered with ornamental vertical fluting from St. John's. The chimneys are of red bricks, and between them is a cubular turret covered with copper, and used for the purposes of ventilation. Inside, Boyle's ventilators. The portico stands on wood columns supporting wooden roches. It has a heavy cornice and old timbered

front. In a lower panel, with a bordering scroll, is an inscription. The portico leads to a hall with a floor of small plain red tiles. This hall gives communication with the large meeting-room, the private apartments of the caretaker, a committee room, and, by means of a staircase and balcony above, to another room which will serve as a place of gathering; and on the other side to the private sleeping apartments of the attendant. The large hall is 43 ft. by 23 ft., and will seat 250 people. At one end, in a recess, is a stage communicating with an ante-room having its own exit and entrance. There is a "crush-door" to the hall self-close to the stage, and a third door giving admission to the caretaker's rooms. The roof is of lofty pitch, and borne by timber principals. A paneled dado runs round the whole room. Warmth in winter will be supplied by a large open fire place. Behind are hot air chambers, with openings into the room through the multiple. The apartment is lit by lead-light windows. Adjoining the hall is a soup-kitchen.

BOARD SCHOOL, SHEFFIELD.—The new school erected by the Sheffield School Board at Woodburn was opened on the 29th ult. by Mr. J. N. Coombe. The schools, which are close to the pit of the Nunnery Colliery Company, have been erected at a total cost of 14,750*l.* They are to accommodate 432 boys, 432 girls, and 300 infants. The plans were drawn by Messrs. Wightman & Wightman, but on the death of the principal partner of that firm the work, says the *Sheffield Telegraph*, was taken in hand by Mr. E. Holmes, of St. James's-row, Sheffield. The principal contractor was Mr. J. Morton, Sheffield; others doing different portions of work being Mr. T. Astley, carpenter and joiner; Mr. J. B. Corrie, plumber; Messrs. C. Chadwick & Sons, slaters and plasterers; Mr. E. Smith, painter; Mr. J. Scrimshaw, skylighter; Mr. R. White, ironworker. The gas-fittings were supplied by Messrs. W. Emery & Co., and the clocks by Mr. J. Dawson. The schools have been heated throughout on the low-pressure principle by Messrs. Newton Chambers & Co. The clerk of the works was Mr. Cartwright.

DRILL HALL, WINCHESTER.—The new Drill Hall referred to on p. 164 of our last issue is being erected at Winchester, not at Alton, as inadvertently stated.

SANITARY AND ENGINEERING NEWS.

PRECAUTIONS AGAINST THE CHOLERA.—The Local Government Board and the Port Sanitary Authorities of London and other ports appear to be taking prompt and vigorous measures to intercept and isolate cholera patients arriving from abroad. So far there appears to be no undue ground for alarm, but increased attention must be paid to sanitation, both domestic and public. The *Times* states that the Local Government Board has addressed letters to the London Water Companies which take their supplies from the Thames and Lea, representing to them the necessity of bestowing special attention on the filtration, of employing an extra thickness of sand, of allowing the water to pass through as slowly as practicable, and of taking care to remove all surface foulness from the layers of filtering material. Such of the Companies as derive part of their supply from deep wells in the chalk are also requested to distribute as much water from that source as possible, rather than river water. The local authorities are taking action for the setting-apart of buildings as isolation hospitals should they be needed.

BOYLE'S VENTILATING APPLIANCES IN THE EAST AND IN AUSTRALASIA.—We learn that Mr. Robert Boyle has just completed another voyage round the world (his fourth), in the interests of the ventilating and sanitary appliances of which he is the inventor, and which are manufactured by Messrs. Robert Boyle & Son, Limited, of London and Glasgow. Two years ago Mr. Boyle made his third tour round the world, when he visited Egypt, India, China, and Japan, and last year he travelled through South Africa. On both of these journeys we learn that he was highly successful in stimulating an interest in sanitary matters, and in securing the adoption of his systems of ventilation and sanitation. Mr. Boyle has been no less successful throughout the tour just concluded, in the course of which he visited Burma, the Malay Native States, Sumatra, Siam, Borneo, Java, Australia, New Zealand, Samoa, the Sandwich Islands, and America, where he saw the different buildings comprising the Chicago Exhibition, and furnished plans and estimates for their ventilation. We may mention that the Kimbrey Exhibition, South Africa, is ventilated throughout with Mr. Boyle's system. Agencies have been established in the different countries visited, and arrangements completed in each of the Australian colonies and New Zealand, and for the manufacture of the latest and improved form of the self-acting air-pump ventilator, and other ventilating and sanitary appliances. As evidence of the confidence of the agents appointed in Australasia with regard to business prospects, it may be stated that they have undertaken to sell, within a specified time, not less than 10,000 worth of the air-pump ventilators, &c., representing ventilating contracts of the value of about 40,000*l.* though at least double that amount of business is confidently expected to be

realised. The Boyle system is specified for the New Jubilee Hall to be erected in Rangoon, and Mr. Boyle has furnished plans and estimates for the ventilation of the Palace of the King of Siam, at Bangkok; Government Buildings and Museum, Batavia; Houses of Parliament, Ceylon; Municipal Buildings, Hospital, and New Theatre, Sydney; Houses of Parliament, Stock Exchange, Commercial Bank, and Bank of Victoria, Melbourne; also a system of ventilation for the new drainage scheme in Melbourne. At Adelaide the air-pump ventilators are employed for the ventilation of the Houses of Parliament, Government House, Government Buildings, Supreme Courts, Post Office, Hospital, Art Gallery, Museum, University, and other public buildings. At Christchurch, New Zealand, the house drainage is, we are informed, in accordance with the drainage regulations, exclusively ventilated with the air-pump ventilators, and it is estimated that there are over 5,000 in use for this purpose in Christchurch alone; most of the public buildings are also ventilated with the Boyle system. The air-pump ventilators are also employed for the house drainage, Wellington, several thousands being fixed. They are also in use on the Houses of Parliament, Government House, Government Buildings, Post Office, Supreme Courts, Hospital, Opera House, &c., whilst at Dunedin and Auckland Boyle's system is likewise in general use. Mr. Boyle informs us that he has received a large number of reports from Government engineers, architects, and City Surveyors, testifying to the success of his system in the Colonies.

FOREIGN AND COLONIAL.

FRANCE.—It is announced that the architectural department of the municipality of Paris is to undertake shortly the restoration of the celebrated tower of "Jean sans Peur" in the Rue Etienne Marcel, which has been long in a dangerous condition.

The "Société d'Histoire et d'Archéologie du Vieux Montmartre" has requested of the Paris municipality that the statue of Claude Chappa, inventor of the aerial telegraph, should be placed on the Boulevard de Rochechouart, in memory of the first telegraph established in 1793 on the tower of the Eglise St. Pierre.—An international exhibition of Industry, Horticulture, and Fine Arts is to be held at Monaco during the months of January, February, and March of next year.

—To-morrow (September 4) is to be inaugurated the colossal statue by M. Falguère symbolizing the union of Savoy and France in 1795. The statue, which is in bronze, stands on a pedestal 33 metres in height, ornamented with a bronze garland hiding together the escutcheons and coats-of-arms of the seven ancient provinces of the Duchy of Savoy.—At Lille the competition for a monument to M. Testelin has just been decided; the design of M. Cordonnier has been selected, consisting of a bust on a column, beneath which is a figure with outspread wings representing "La Défense Nationale." At the foot of the column are grouped soldiers, one of whom unfolds a standard while the other sounds a charge. The seated figure symbolises "La République" and "Le Peuple." The committee formed at Paris for the erection of a national monument to Joan of Arc has entrusted its execution to M. Mercier. The monument, which will be of marble, is to be finished in about a year from now, and will probably be exhibited in the next Salon.—M. Théophile Banau (sculptor) will shortly complete a statue of General Kellermann for the monument in commemoration of the battle of Valmy, which will probably be inaugurated at the end of the month of September. On the occasion of the ceremony a retrospective exhibition is to be organised at Châlons-sur-Marne of various objects connected with that battle, which are already collected to the number of more than three hundred, and include arms, manuscripts, plans, orders, drawings, and uniforms.—The Town Council of Pontacq (Basses Pyrénées) has decided to raise a statue to General Barbanègre, a celebrated soldier of the First Empire, who was born in that locality. It is Barbanègre who forms a prominent figure in M. Détaillé's picture of the surrender of Huningue, exhibited in this year's Salon.—The Decauville Railway Society has opened a new line from Cabourg to Lue-sur-Mer.—A new railway line has been opened from Arles to Saintes-Maries, traversing the plain of Camargue.—The decease is announced, at the age of seventy-six, of M. Geoffroy Dechaume, curator of the museum of sculpture at the Trocadéro. An eminent sculptor and passionate lover of French art, he contributed largely to the restoration of the Medieval sculpture of the country. He was a zealous collaborator with Viollet-le-Duc in the restoration of the Sainte-Chapelle. He modelled the fine medallion of Corot which adorns the monument of that painter at Ville d'Avray, as well as the marble statue of Béranger on his death-bed, which is one of the best works in the Luxembourg; and he rendered great service in the organisation of the Trocadéro Museum, and in overseeing the casting of the examples, as well as in the selection of works to be reproduced.

COMPETITIONS AND CONTRACTS.

COMPETITIONS.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.—Continued.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., & viii.

MISCELLANEOUS.

THE MANCHESTER ROYAL INFIRMARY AND THE PROPOSED EXTENSION.—A meeting of the Board of the Manchester Royal Infirmary was held on the 29th ult., Mr. E. S. Heywood in the chair.

THE RAILWAY ACCIDENT NEAR MELTON MOWBRAY.—Major Marindin has issued his report to the Board of Trade on the accident near Melton Mowbray, on the Great Northern and London and North-Western joint line, which occurred on July 25, and caused the death of three persons.

20-25 dols., and lowest in Newark (New Jersey), namely, 11 cents. The figures for the five largest cities are:—Chicago, 3-18 dols.; St. Louis, 1-85 dol.; New York, 68 cents; Philadelphia, 61 cents; Brooklyn, 49 cents.

THE MACKENZIE TOMB IN GREYFRIARS CHURCH-YARD, EDINBURGH.—A remarkable tomb in Greyfriars Churchyard, Edinburgh, has just been restored by the care of Lord Wharmcliffe and the Marquis of Bute, under the careful superintendence of Dr. Rowand Anderson.

who made additions to Holyrood for Charles II. took part in completing Heriot's Hospital, and is himself buried at Holyrood." and the tomb of the "Bloody Mackenzie," the prosecutor of the Covenanters, has thus been restored, the burial place of John Knox, the Scottish Reformer, remains unmarked by any monument, and is left exposed to rolling vehicles in a public square.

MEETINGS.

TUESDAY, SEPTEMBER 6. Glasgow Architectural Association.—Paper by Mr. Charles R. McIntosh entitled "An Italian Tomb." Sp.m.

RECENT PATENTS: ABSTRACTS OF SPECIFICATIONS.

8,292.—ARTIFICIAL STONE BLOCKS: G. M. Graham.—This invention relates to artificial stone blocks for building purposes, as well as for street and sidewalk pavements, and consists in the peculiar formation of the protruberances by which interlocking joints or seams of the building blocks are attained, the object of which is to so form the joggles or dovetails of the blocks as to permit joining them in close proximity on all the sides of each of the seams, to reduce the building material for the same, and to increase its strength.

AMERICAN "SOCIAL" STATISTICS.—Amongst the various bulletins issued by degrees from the Census Office of the United States on the results of the 1890 census, perhaps none is more interesting than that dealing with "social" statistics of cities. The latter include density of population and death-rate, street paving and lighting, waterworks and sewers, police and fire services, contagious diseases, street paving and lighting, waterworks and sewers, the chief thing that strikes us is the great differences prevailing between the different cities.

and the specific gravity increased. It is then dried, and treated in the same manner in a similar apparatus, oil being substituted for the water in such quantity as will...

12,633.—ARTIFICIAL SPONGE: T. D. Harris.—This invention consists in the proper proportion of proportions with metalliciferous matrix after the separation of the contained metals as far as practicable by the usual processes.

11,773.—WATER-CLOSETS: S. Jennings and J. Mackay.—This invention relates to water-closets which are emptied by syphoning. In such closets inconvenience is caused by the pouring of slops into the pan starting syphonic action, leaving the pan empty and the trap unsealed.

10,939.—SCAFFOLDING: F. Weldon.—The main object of this invention is the construction of a device to be employed in erecting scaffolding in place of the rope lashings ordinarily used, and this device consists of a short length of wire rope or chain, furnished with a loop at one end and a spike at the other.

9,266.—BRICK DRYING: Max Wolf.—The object of this invention is to provide a constant current of air drying bricks, and the apparatus adapted for this purpose is a drying kiln, the interior of which is lined with material to be dried.

11,105.—WATER-CLOSETS: P. Bright.—This invention relates to that kind of water-closet the basin of which is formed with an apron, skirt, or shield in front, which usually extends more or less round the sides, and which supports the weight of the basin and of the person using the closet.

11,407.—ENAMELLED BRICKS: C. F. Hall.—This patent relates to an improved method of enamelling or glazing bricks. This is effected by heating the surface which it is proposed to enamel, and applying to this surface a sufficiency of finely powdered enamel of a composition such as is detailed in the specification.

NEW APPLICATIONS FOR LETTERS PATENT. August 15—14,673. W. Greaves, Domestic Fire-grate or Stove—14,681. J. Helliwell, Apparatus for Carving Wood, &c.—14,682. J. C. Cochrane, Improved Buffer for Water-closet Seats—14,683. C. Price, Combination Drain-plug—14,724. E. Edwards, Feeding and Driving in Nails—14,726. G. Horper, Compound or Composition for Cleaning or Removing Paint and Varnish, or for Cleaning Wood, Metal, and Stone.

August 17.—14,831. E. Hoyle, Fastening Nashes.—14,839. H. Atkinson, Ovens and Kilns for Boring and Drying Bricks, Tiles and similar Articles of Earthenware.—14,838. J. Day, Water-closets, more especially in Closets for Utilising Waste Water.—14,871. W. Drayson, Starting Syphons of Finishing Cisterns.—14,888. R. Kirkland and H. Thurton, Pails.

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August 19.—14,954. L. Russell, of the firm of Saunders, Davies, & Co., Raising, Lowering, Adjusting, and Fastening the Sashes of Windows.—15,063. J. Weddington and J. Pendlebury, Devices or Means for Retaining Windows or Doors in any Position.—15,007. J. Winslade, and J. Jenkins, Door-check or Fastener.

August 20.—15,018. E. Partridge, Scaffold and Means for Attaching same to a Ladder.—15,045. A. Fowler, jun., Water-closets.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,127. J. Webb, Ventilating Sewers.—12,455. H. Dippet, Nails.—12,922. C. Taylor, Jankers, Flaming, or Shoothing Mitres.—13,232. C. Gerdel, Water-closet Basin.—13,244. E. Turner, Self-flushing House or Sewer Drains.—13,251. J. Adair, Bakers Ovens.—13,435. J. & S. Shellock, Nails.—13,577. J. Macgillivray, Smoke-testing Machines for Testing Drains, Soil and Waste Pipes.—13,753. E. Wileman & J. Helroyd, Water-waste Preventers or Flushers.—13,825. W. Hartley & W. Benkinson, Waterproof Coverings for Roofs and Walls, such like purposes, or as a substitute for glass.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.) 17,502. W. Wooler, Interlocking Roofing Tiles.—17,881. C. Shoppe, Facing Bricks.—18,085. A. Poppl, Roofs.—12,174. O. Terp, Artificial Stone and Hard Compositions applicable to Building and Paving purposes, to be used for Cement, Castings, and Strates, &c.—12,539. H. Peigh, Ventilating Buildings or Structures.—13,223. H. Leigh, Enamelled Bricks.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 23.—By Richardson & Barton: 10, Alms-st., Kentish Town, n. w., 2 1/2 a., 250 s., 200 s., and 300, York-st., n. w., 1, Waple Way, Wandsworth, n. t. 65 yrs., g. r. 12, 550l.—By F. J. Dingley & Sons: 27, Lower-rd., Rotherhithe, n. t. 49 yrs., g. r. 12, 10s., 220l., 19 and 21, Diston-grove, n. t. 58 yrs., g. r. 10, 230l.—By W. P. Hayward (of Ashford), Enclosures of land, 13a. 3r. 3p., f. Lyninge, Kent, 630l.; f. dwelling-house, r. 10l., 220l.; f. marsh land, 24a. 3r. 2p., Newchurch, Kent, 1,350l.

AUGUST 24.—By J. Baker & Son: 70, Carlton-vale, Kilburn, n. t. 69 yrs., g. r. 10l. 10s., r. 50l., 450l.; 66, Carlton-vale, n. t. 69 yrs., g. r. 10l. 10s., 425l.; enclosure of f. land, Riddle, Middlesex, cont. 1, 453 a.

AUGUST 25.—By Stinson & Sons: F. g. r. of 14, Ryeland, Peckham, reversion in 51 yrs., 360l.; f. g. r. of 10l. 10s., ditto in 76 yrs., 270l.; Atwell-rd., f. g. r. of 6l. 1s. 6d., ditto in 59 yrs., 170l.; 73, Whitehouse-rd., Tottenham, n. t. 85 yrs., g. r. 6l., r. 30l., 200l., 41 and 46, Cavendish-rd., Harringay, f. 700l.; 10, Adair-rd., Cumberwell, n. t. 50 yrs., g. r. 5s., r. 36l. 8s., 105l.; 25 and 25, Pulvers-rd., Beckton, n. t. 72 yrs., g. r. 6s. 3d., r. 7l. 15s., 476l., 33, Chantry-rd., n. t. 70 yrs., g. r. 7l., r. 35l., 270l.; 38, Stansfield-rd., n. t. 78 yrs., g. r. 6l. 6s., r. 55l., 270l.; 39, Ellison-rd., Streatham, n. t. 57 yrs., g. r. 10l., r. 300l., 250l.

3 Controversies used in these Lists.—F. g. r. for freehold ground; l. g. r. for leasehold ground; r. for rent; f. for improved ground; c. for ground-rent; r. for rent; l. for freehold; c. for copyhold; l. for leasehold; e. r. for estimated rental; u. t. for unexpired term; p. a. for per annum; y. r. for years; s. t. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; crea. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

Table with columns for Timber, Metal, and other materials, listing prices for various types of wood, iron, and steel.

TENDERS.

[Communications for insertion under this heading should be addressed to 'The Editor,' and must reach us not later than 12 noon on Thursdays.]

ABINGDON.—For new premises, High-street, Abingdon, for Mr. J. C. Clark, Mr. J. G. P. West, architect, Abingdon. J. C. Kingler, £1,000; J. Puckle, £826; Williams & Son, £66; G. Wheeler, £815; W. Goodchild, Reading, £82. Accepted.

ANNESLEY WOODHOUSE (Notul).—Accepted for building Wesleyan schools, Annesley Woodhouse, Mr. W. J. Willm, architect, Derby. J. Munks, Hucknall, 2,703 10 0.

BIRMINGHAM.—For the erection of a dwelling-house, Willow-crescent, for Mr. F. Thompson Brown, Mr. W. J. Willm, architect, Derby. W. Hopkins, £419; W. Ambley (modified), £437; G. Holt, £391. Accepted.

BIRMINGHAM.—For the erection of a dwelling-house and stable, Cannon-hill, for Mr. G. H. Hopkins, Mr. W. J. Willm, architect, Cannock. J. Munks, £400; W. Hopkins, £251; Ludley & Evans, £58; W. Ambley (modified), 497. Accepted.

BIRMINGHAM.—For the erection of two villa residences, Egbank, for Messrs. R. Bowley and Alfred Wallis, Mr. W. J. Willm, architect, Derby. Henry Hughes, £590; J. R. Turner (modified), £250; W. Hopkins, £895. Accepted.

BISHOPSTOKE (Hants).—For roadmaking, fueling, &c. for the County of Hants Land and Building society, Mr. William Burrough Hill, surveyor, Southampton. Roadmaking. J. F. Paddington, £1,200 0 0; Morgan, Islet, & Co., £293 0 0; J. Bent (road and), 1,062 18 5; H. J. Sanders, £910 0 0; J. Clark & Son, 1,015 10 10; H. J. Sanders, £87 7 0; Southampton, £87 7 0. Accepted.

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BURLEY (Stuffs).—Accepted for the erection of a group of school buildings, with teacher's house, at Longport, for the Burley School Board, Mr. A. R. Wood, architect and surveyor, the Tunnel, Leeds. Quantities supplied.—Wm. Grant, Burley, £4,520 0 0.

CADISHEAD (Lancs).—Accepted for the warming and ventilating of Cadishead day schools.—John Grundy, London, £132 0 0.

CHARD.—Accepted for building Institute and Club-house, Chard, for Messrs. Boler & Co., Mr. John Wills, architect, Derby. F. Hill, Chard, £1,415 0 0.

CRICKLEWOOD.—Accepted for pulling down old and rebuilding new stables, coach-house, gardener's cottage, &c., and alterations to part of Cricklewood House, for Misses Rose.—H. B. Oldrey, Kilburn, £4,750 0 0. [No competition.]

DERBY.—Accepted for improvement to Corporation Church, London-road, Derby. Mr. J. Wills, architect, Derby. William Eaton, Derby, £1,310 0 0.

EAKING (Notul).—For building Wesleyan Chapel, Eaking, Mr. J. Wills, architect, Derby.—£479 25 0.

FARHAM (Hants).—For the erection of two detached residences at Catfield, near Farham, Hants. Mr. Walter Judd, architect, 3, Norfolk-st., Southsea.—William Biles, Winchester, £1,700 0 0.

GOWERTON (Gloucestershire).—For alterations and additions to Board School, Gowerton, Loughor, for the school Board, Mr. T. P. Martin, architect, Hatfield-road, Swains. Quantities by the architect.—Bennett Bros., £569; David Jennings & Co., £535; Thomas, Watkins, & Co., £50. [All of Swains.] Accepted.

GHAY'S THURLOCK (Essex).—For granite road metal, for the Gray's Thurlock Local Board, Mr. Charles Cobham, surveyor.—Quarry. W. Gray & Son, £50; Stoney Station, £2 0; J. Mowley & Co., £3; Gurney, £13 0; A. & F. Manning, £11 11; W. Chaudley & Co., Not stated; £11 11; Kent road, £10 11; Ch. M. Manning, £11 0; Kent road, £10 11; J. L. Lyon & Co., Not stated; £10 5; St. Cuthbert & Co., £10 4; L. Summer-Id., £9 10; W. H. Wheeler, £9 7; M. & Co., £9 10; street, Gray's, £9 5; Belgium, £9 5.

HANTON-IN-ARDEEN (A Warwick).—For the erection of four cottages and retail shop, for Miss E. Whitten, Mr. W. J. Willm, architect, Derby. Messrs. Brown, £1,076 0 0; Three Shilcote, £845 0; Curran & Lewis, £85 0; Thos. Bates, £86 0; T. Milward, £64 0; Palfrey, £80 0; D. Marriott, £85 0. Accepted.

HUCKNALL (Notul).—Accepted for building Wesleyan schools, Hucknall, near Mansfield, Mr. J. Wills, architect, Derby.—Henry Gilbert, R. Kirby, Notts., £250 0 0.

ITTON COURT (Mon).—For erecting stables and offices at Itton Court, Monmouthshire, Mr. E. Gray Dawkins, architect, 21, Buckingham-st., Abingdon, London, W.C. Stephens, Parnock, & Co., £1,423; Fawcett & Son, £3,594; Foster & Dickson, £4,282; Colwell & Son, £3,959; Drew Bros., £420.

JARROW.—For additions to Jarrow police station, Mr. William Crozer, A. M. East C. E. County Architect, Shire Hall, Durham. Quantities taken off by Mr. J. Ezra Miller, 1, Tansill-road, Sunderland. Thomas Lundsen, £1,163 0 0; W. C. Arkhott, £1,030 0 0; James Storey & Son, Jarrow (accepted), £26 0 0; H. Brown & Co., £85 19 9.

LANGLEY (Backs).—For the erection of workmen's club and reading room, for the Misses Harvey. Mr. Albert E. Pilsbury, architect, 2, Broad-street Buildings, E.C. Quantities by Mr. R. J. Stamp. —
 J. Beverell £288 0 H. King & Co. £770 0
 Geo. Bate & Son £270 0 Farnside & Son £29 10
 John Wood 710 0

BLANDFORD.—Accepted for building Wesleyan Church parlour and sexton's lodge, Blandford. Mr. J. Wills, architect, Derby. —
 Thos. Jones, Blandford £747 6 0

LONDON.—For alterations and additions at the "Queen's Head," Han, Albemarle-street, Piccadilly. Mr. Fred. G. Utterton, architect, 9, Old Jewry Chambers, Cheapside, E.C. —
 H. & E. Lee 2,095 Courtney & Fairbairn £1,867 10
 H. Hollingsworth 1,897 * Accepted.

LONDON.—For alterations and additions at the "Leal Cynde," Copenhagen-street, Caledonian-road. Mr. Fred. G. Utterton, architect, 9, Old Jewry Chambers, Cheapside, E.C. —
 H. Hollingsworth £291 0
 Paterson & McWey 282 0 Custell Bros 519 0
 Courtney & Fairbairn 349 0 H. W. Brown 288 10

LONDON.—For alterations and additions, Hillmartin College, Busby place, Camden-road, N.W., for Mr. G. F. Carr Vernon. Mr. Arthur S. Pridmore, surveyor, 140, Junction-road, N. Quantities by Bell & Brown (acceptor). £352 4 0

LONDON.—For alterations to the "Faul" beer-house, Pall-street, Strand, for Mr. Frank H. Weald. Mr. W. M. Britton, architect, 37, Queen Victoria-street, E.C. —
 J. Arnold £217 Fitchard & Kenwick, South
 W. J. Melliss 547 work £208 8
 E. Nortonwood 220 * Accepted.

LONDON.—Accepted for new fittings, &c., to "Old Crown and Cushion" public-house, Westminster Bridge-road, S.E., for Messrs. W. J. Grimes & Co. Mr. W. M. Britton, architect, 171, Queen Victoria-street, E.C. —
 W. Smith, Kennington £1,638 0 0

LONDON.—For alterations, additions, and shop fittings at No. 6, Ewance-terrace, Kensington, for Mr. Daniel Casan, Mr. Charles J. Baker & Co. £277 Leslie & Co., Kensington-
 Street Hill 728 "supper" £715
 J. Whitaker 728 J. H. Reynolds 760
 C. F. Kealey 723 * Accepted subject to modifications.

LONDON.—For painting and repairs to St. Alban's place, for Mr. W. Ashbridge. Mr. K. H. Houston, architect. —
 South £110 Gardner & Hood 73

LONDON.—For building the "Queen's Arms," Caledonian-road, Messrs. B. W. Walters, architects. —
 Marks & Co. £5,296 Todd £4,029
 Gould & Brunel £124 W. & H. Lee, etc. 3,355
 Tomlin 3,570 Burrows & Son 3,348
 Williams & Son 4,983 Edwards & Medway 3,854
 Goodall 4,160 * Accepted.

LONDON.—For decorative works, &c., to No. 60A, Hamilton-terrace, Abchurch-lane, W., for Mr. H. C. Ash. Mr. Walter J. Ebbetts, architect, Savoy House, 115, Strand, W.C. —
 J. Freeman £1,520 B. A. Vestbury £1,330
 H. Haas 1,577

LONDON.—For alterations to the nursery block at the Work-house, Marlow-road, for the Guardians of the Parish of St. Mary Abchurch, Kensington. Mr. Thos. W. Altwasser, architect, 1, Head & son £225 J. Inwood £297
 James & Harvey 230 H. Baynes 196
 Norris & Luke 213 Best Bros. & Co. 289
 Leslie & Co. 211 A. F. Wells* 158
 G. P. Kent 209 * Accepted.

LONDON.—For repairs and alterations to 1 to 8, Addington-street, Lambeth. Mr. A. Farnock, surveyor, 93, York-road, Lambeth. —
 Ford £268 Laphouse £359
 Peacock Bros. 283 * Accepted.

LONDON.—For alterations and partial reconstruction, Nos. 55 and 57, York-road, for Mr. Roberts. Mr. A. Farnock, surveyor, 93, York-road, Lambeth. —
 Laphome £460 Peacock Bros. (acceptor) £125

LONDON.—For alterations and additions to Nos. 23 and 27, Grove End-road, for Mr. S. C. Newton. Mr. Marshall N. Isaacs, architect. —
 Allen & Sons £1,075 H. R. Oldrey £905
 C. Burge 1,530 Chessum 790
 Farness & Fotheringham 897

LONDON.—Accepted for alterations to Melville House Mount View-road, N., for Mr. G. Edmund. —
 T. B. Lever & Co., Crossin-road, Harnsey £260 0 0

MANSFIELD.—Accepted for extension to Wesleyan Mission Room, Mansfield, Nottingham. Mr. J. Wills, architect, Derby. —
 J. Munk, Hucknall, Toward £75 10 0

NEWPORT (Mon.)—For taking down Nos. 52 and 53, Commercial-street, Newport, and erecting new shops, two floors, offices, work-shops, &c., for the Trustees of the same. Mr. E. A. Llewellyn, architect, Guildhall-chambers, Newport. —
 Frank Ashby £4,340 10 4 Wm. Price £4,106 0 0
 Stephens, Bantow, & Co. 2,968 0 E Richards 3,891 0
 Dyson Parfitt 4,250 0 C. Locks 3,775 0
 Morgan & Roberts 4,525 0 G. Wilkins 3,748 16 0
 A. Linton £210 0 0

PORT TALBOT (Glamorganshire).—Accepted for building Wesleyan Chapel, Port Talbot. Mr. J. Wills, architect, Derby. —
 R. C. Jones & Co., Gloucester £2,450 0 0

SETTLE (Yorkshire).—Accepted for building Wesleyan chapel, &c., Settle. Mr. J. Wills, architect, Derby. —
 Hargreaves, Settle £1,865 0 0

TUNBRIDGE WELLS.—Accepted for building Baptist Schools, Tunbridge Wells. Mr. J. Wills, architect, Derby. —
 J. J. Cole, Tunbridge Wells £1,500 0 0

WOLVESHAM (co. Durham).—For erecting a new bridge across the River Wear, at Wolvesham. Mr. William Crozier, A.M., inst. C.E., County Engineer, Shire Hall, Durham. Quantities by Mr. J. Ezra Miller, 1, Fausell-road, Sunderland. —
 Edward Patten £4,995 18 2 W. C. Atkinson £4,167 16 4
 Geo. Westgarth 890 0 0 Stockton-on-Tees £4,167 16 4
 * Accepted.

WOODFORD (Essex).—For the erection of detached residence, for Mr. A. J. Hall. Mr. T. Chapman Barraud, architect, Hill-street, Bocking, Essex. Quantities supplied by Mr. J. E. Bayly, Bayly & son £791 Cobhead £744
 Osburn & Son 750 White 729

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The Builder.

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SEPTEMBER 10, 1902.

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Church, Ashton-under-Lyne.—Mr. John Brooke, A.R.I.B.A., Architect	Double-Page Photo-Litho.
Details of Pedestal of the Burns Statue, Ayr.—Messrs. Morris & Hunter, Architects	Double-Page Ink-Photo.
Clopton Chapel, &c., Stratford-on-Avon Church.—Drawn by Mr. R. W. Paul	Single-Page Ink-Photo.
The Burns Statue, Ayr.—Mr. G. A. Lawson, Sculptor	Single-Page Ink-Photo.

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The Institute and Architecture.

WO letters under the above title, one in our last and one in the present number, represent we presume the opinions and position of those members within the ranks of the Institute who are more or less in sympathy with the group of architects now, for convenience of expression, usually referred to as "the memorialists," but who have not carried their opposition to the length of formal secession from Conduit-street. That they have not done so argues that at least they are in a more reasonable frame of mind than the outside opponents of the Institute, who seem to regard it as a mere camp of the Philistines, against which every righteous servant of architecture should shake off the dust of his feet; and it does seem to be possible to understand what Mr. Belcher and Mr. Brydon want, which is hardly the case in regard to the outside dissentients. Mr. Belcher moreover, does appear to recognise that the Institute has done something for architecture; that it has raised the character of the architect and surveyor, has encouraged students by offering prizes, and has founded a library of great value; the last not the least of its services, though one which most of its critics entirely ignore.

Both our correspondents affirm that the Institute has arrived at a "crisis" in its career, and a crisis which has been brought about by its own mistaken policy. In regard to one point, to be noticed just now, we are so of opinion that the Institute has landed itself in a difficulty arising out of its recent course; but as to the "crisis," it appears to us that the position is this—that a certain number of architects have taken up a rather one-sided and sentimental notion of architecture, and demanded that the Institute should accept their views, and as it officially declines to do so they cut the connexion and use any injurious terms about the Institute, and then tell that body it is all their own fault.

Such a state of things may be a crisis in the history of a corporate body, but it may be a question which of the two parties is to blame for the "crisis."

Mr. Belcher goes into a definition of what architecture as an art includes, which is all true though not new, in which we do not believe anyone will differ from him materially, and which it seems in fact hardly necessary to repeat now. Architecture is the artistic treatment of a building not merely as regards exterior design and detail, but as regards the whole conception of a building in plan, section, and elevation. No one will differ from him here. The only criticism on the definition that we should venture to suggest is the negative one, that construction in a scientific sense seems to be passed over. The omission might not be noticed or regarded as intentional in Mr. Belcher's letter, were we not aware that eminent men among the memorialists, with whom Mr. Belcher is evidently much in sympathy, have openly declared that we have engineers to look after construction, and sanitary engineers to look after drainage, and that the architect in the true sense of the word has nothing to do with these matters. It seems almost incredible that any architect should deliberately lay down this position, but it certainly has been laid down in print in the most positive and unmistakable language by one of the most eminent opponents of the Institute, and therefore we presume that the omission of any decisive reference to that part of architecture in Mr. Belcher's letter is not altogether unintentional.

Considering that architecture means building in the first place—building with other qualities superadded to it, but good building as the basis of the whole, this anti-scientific view of it is lamentably deficient. So far from exalting architecture, such a view of it appears to us to be depriving the art of a part of its dignity and completeness. Regarded merely as a matter of sentiment and fancy, architectural design cannot be considered (as some do vainly pretend) as an art on a level with sculpture and painting. In a certain sense it is a greater and grander art perhaps than either of those; but regarded merely as a means of artistic expression it cannot reasonably be put on a level

with them. It is in its virile character, as a pursuit in which exact science is the basis of artistic expression, that a great part of the special dignity of architecture consists. To divorce the scientific element from it is to remove a portion of its special claim to respect. Architecture differs from all other forms of art just in this respect, that it is scientific construction carried out with a view to æsthetic expression. To regard the architect as merely concerned in designing, apart from construction and sanitation, is a position which, in its logical consequences, must lead in the end to make him an artistic inventor and draughtsman of forms instead of the master of the works. Mr. Brydon refers to the fact that the Institute has recently lost certain clever young men who will be the leaders in future days. We question whether any architect will ultimately be a leader who turns his back on the scientific side of his work. For a short time it may be so, but in the end the common-sense view of architecture as the art and science of building will prevail.

The establishment of the Institute examination as a test for young men entering its ranks is a practical recognition of this truth, and a recognition which public opinion seems to have called for. The objection made to it on the part of our correspondents and their allies outside the camp is that it includes to some extent an examination in architecture, that is, the production of work showing a certain standard of design and drawing. The critics of the examination system object to this on the ground that no one can be examined in art; which in a certain sense is perfectly true. But the objection, as far as our correspondents are concerned, is inconsistent with their own position in regard to the future election of Fellows.

The one difficulty, referred to just now, in which the Institute seems to be landed by its own action, is that while Associates are called upon to pass an examination test, candidates for the higher grade of Fellows can when of a certain age and standing, obtain entrance without this test. This is no doubt an anomaly, and it creates a difficulty which we have felt for some time past to be impending. The way out of it which is proposed by the supporters of the Institute

system is that Fellows (except under the powers of the Council to dispense with any such condition) should only be elected from the ranks of the Associates, which of course is practically making an examination test for Fellowship also; and we believe some members of the Institute contemplate even an examination test for Fellows apart from any such restriction. There is no doubt that this would be taking up a position which never has been taken up by any corporate society at all resembling the Institute of Architects. It would be an anomaly, and it is not very easy to see the way out of it. The proposition made by the first of our correspondents and supported by the second, and which we believe others are prepared to support, is that Fellowship should be conferred as a distinction, in consideration of the excellence of a man's work and the artistic power displayed in it. This is a proposition quite worth considering, but what we wish to point out in the first place is that it is open to just the same objection which the critics of the Institute make to the small amount of purely architectural examination which is included in the programme of the associateship examination. A candidate for Fellowship will in that case be elected or not in accordance with the opinion of the Council as to the merit of his executed works. A candidate for Associateship is at present passed or not passed partly in accordance with the opinion of the examining body on his designs of unexecuted work. Where is the difference in principle? If it is impossible in a strict sense to examine in art, equally it is impossible to form an infallible judgment as to the artistic merit of a man's design, executed or unexecuted. The only difference is that in the case of the Fellowship election as proposed, the selection is supposed to be made as an honour, in consideration of the exceptional merit of a man's work: in the case of the Associateship the candidate is refused if the work he sends up is below a certain standard. In one case, we may say, it is an appreciation of maximum excellence, in the other an appreciation of minimum excellence. But the principle and the process are the same in both cases. The result would arise from the judgment of certain persons appointed to judge, in regard to qualities about which there exists no infallible standard, and which cannot be reduced to any absolute test of right or wrong, correct or incorrect. The election of a Fellow as an honour might be conferred on some one whose works, in a very few years, might in the process of changes of taste be put on a much lower level; just as in the Royal Academy artists have been elected whose claims to such an honour were either not ratified by general artistic opinion at the moment, or were perceived some time afterwards to have been insufficient. To select a man for election as a Fellow on account of the artistic excellence of his work is only another way of "examining architecture." It is sitting in judgment on his artistic quality, which is just what we are told we are not to do. We see no unanswerable objection to either proceeding, but objections which apply to the one apply with all events nearly equal force to the other.

As to the question itself, of making election to Fellowship of the Institute a mark of honour in the same sense as the election to membership of the Royal Academy, the reasonableness of the principle depends mainly on the view taken of architecture. If it is regarded purely as an art, it is on the same footing as election to membership of the Royal Academy. If we regard architecture as a skilled profession with artistic expression as its crowning glory, the position is somewhat different. The adoption of the newly-proposed principle would entirely alter the character of the Institute, and put it on a different footing from any other professional representative body, as of course those who think that architecture is not a profession but an art would say it ought to be. If the adoption of this principle would in any way tend to heal the breach between the Institute

and the eminent architects who are not and apparently will not be members of it, that would no doubt be an additional reason in its favour. But we regret to feel convinced that this would not be so, however willingly we would be convinced to the contrary. With some at least of the outsiders we fear the truth is that, for reasons it would be invidious to attempt to analyse, and which in fact we cannot exactly profess to understand, nothing that the Institute did would satisfy or please them. They cannot (or do not) even state clearly what they want, but what seems clear is that they do not wish for unity or to give up any of their own special fancies for the sake of harmony and mutual encouragement and help. If they would only do so, they might do a great deal of good, and supply the Institute with just some of those elements which are no doubt lacking in it; but we fear it is of no use to hope for this. There are no doubt faults, shortcomings and misapprehensions on both sides; we certainly do not think they are all on the side of the Institute of Architects, which appears to us to have the best of the matter, if not in genius, at least in logic and in reasonable and charitable feeling.

As to the general and much debated question whether architecture is a profession or an art, and consequently whether the representative body is to be regarded as a guild of artists or a society of professional experts, it may be said that while the "memorialists" have probably done good in raising the question and compelling us to look at all sides of it, the position which they take up in regard to architecture is one in which they seem to be entirely alone in the world. There appears to be, as far as we know, no such heresy (if it be so) among the architects of any other country. It certainly cannot be maintained that architecture is not an art in France; a distinguished art-critic has even suggested that it is more of a living art there than in any other country at present; yet the French architects, so far from desiring to escape from the practical, scientific, or even business side of architectural work, appear disposed to emphasise the practical side, and the necessary training for it, more than ever; and we imagine the position and motives of the seceders here would hardly be understood in that country. That may be an evidence of the inferior artistic feeling of the French; and in certain qualities of picturesqueness some of the best French architects admit (and we quite agree with them) a superiority in England which is perhaps mainly to be found in the works of some of the anti-Institute party. But we are inclined to think that the more comprehensive view of architecture in which the scientific and business elements are included as an integral part of the architects' programme is the view which will be permanently accepted by the modern world, and that it is better for architecture that it should be so. Such a view of the responsibilities of the architect and of the scope of architecture is more robust and masculine than that which sees in it only an occasion for the expression of sentiment in building, and regards the practical side of the architect's work as vulgar and uninteresting, a clog upon his soaring genius. That the full recognition of the practical side of architectural practice is not incompatible with the production of grand architectural conceptions, the name and works of the first "surveyor to the fabric" of St. Paul's are alone sufficient to attest.

PROGRESS OF WORK AT THE BLACKPOOL TOWER.—Messrs. Maxwell & Tuke, the architects of the Blackpool Tower, report satisfactory progress of the works. Messrs. Neill have now completed their contract for the foundations of the tower, and for the foundations of the brick keep surrounding the tower; and the contract for the superstructure has been let to Messrs. James Cardwell Brothers, of Blackpool, who will proceed at once with the work. Messrs. Heenan & Froude are proceeding with the preparation of the ironwork in the yard, and the actual erection of the tower pillars has been commenced. Two of the pillars, 55 ft. in height, are already in position.

LAND AS AN INVESTMENT.



NOT an amusing correspondent has recently been progressing in the *Times* on the rival claim of land and works of art investments. The correspondence begun by Mr. Dowsett, a well-known surveyor and land agent, the editor of a work "Land: its Attractions and its Riches,"* which pressure on our space has hitherto compelled us to leave unnoticed. This work is, in fact, number of short, and, we must add, superficial essays, by the editor and fifty-seven assistants who present every point which tells in favour of the investment of capital in land in a rose coloured light, and touch very lightly, if not at all, on its various drawbacks. The subjects of the essays are so various as to make one think of Lord Bacon's saying that he took all knowledge for his province. Thus while Mr. Bear, not unknown as an agricultural writer, deals with "Tenant Right on the Prospects of Farming," the Rev. F. J. Meyer tells us of "Land in the Jewish Polity," and we even have essays on "Rabbitry and "Bees." But, strange to say, it seems to have been quite overlooked, even by the collective wisdom of Mr. Dowsett and his assistants, that the first necessity for the enjoyment of the country throughout the year is a well-planned and well-built house. To all intents and purposes the country house is passed over in silence, and Mr. Dowsett seems quite to have forgotten to get an architect or two to give some hints to the house owner. This is rather leaving Hamlet out of the play, for bees, rabbits, and cattle are of much less account than the health and comfort of the country resident and his household.

To revert, however, for the present to the recent correspondence, there seems to be a new idea in the minds of some persons that rich men nowadays prefer to invest their wealth in works of art rather than in land. The assumption is quite opposed to the true fact. Millionaires and wealthy men of business buy land just as much as ever they did, but a much larger quantity of land is now in the market than used to be the case. Hence the surveyor, with needy clients at his back, complaining because he cannot obtain a purchaser for their property, no doubt feels aggrieved at the mass of money which has this season been invested in works of art and Christie's. But no one whose occupations give him an insight into the state of rural England can doubt for one moment that wealthy men are yearly investing their riches in land, and spending money on its development, and on the improvements of houses and farms.

But it is equally certain that small capitalists, who, ten or fifteen years ago were willing to put money in land as an investment,—men such as lawyers in country towns,—now fight shy of land. Nor is this surprising, having regard not only to the small return which it brings in, but to the annoyances and drawbacks which are now much more noticeable, and which, with the small return of profit, render it suitable only for men of large means. In saying this we do not include in the term "land" small residential properties in good situations; this is more strictly house property with some attractions, and must continue to have the same value, and be subject to the same possibilities of diminution in worth as heretofore. It is all very well, indeed, for Mr. Dowsett to set out tables of limited companies, the capital value of which has diminished so largely as to make this diminution measurable in millions, and to give instances, as of land in Queen Victoria street, in the City, the purchase of which has made a man's fortune. He prudently omits to give us tables of commercial undertakings which have increased in value, and of properties which have decreased in value all over the country. It would be in

* "Land: its Attractions and its Riches." By Fifty-seven writers. Edited by C. F. Dowsett, F.S.I. London, 1892.

ARCHITECTURAL REMAINS AT
OLYMPIA.

IT is now seventeen years since the publication of the first official record of the excavations at Olympia,—a record that appeared in the "Ausgrabungen." This monumental work was of the first importance as a detailed statement of precisely how and where the discoveries were made, and as a publication of some of the most surprising "finds," notably the sculpture. Necessarily a work published with surprising promptitude after the excavations could not contain either an adequate publication or anything like a full scientific discussion of the multifarious antiquities brought to light,—above all things it was impossible at once to make out the significance of the complex ground-plans of the various buildings and of the architectural *membra disjecta* piled everywhere in confusion. The time is now ripe for a work of very different character. Specialists have been at work for over fifteen years in every department of the Olympian antiquities, and the results of their investigations are to be embodied in a vast work, entitled "Olympia," of which the section on bronzes appeared a year ago, and of which the architectural section, the "Baudenkmal" (Vol. I.) now lies before us.*

The first volume contains, as is natural, the more important buildings, those whose fame have reached the outside world,—i.e., the Temple of Zeus, the Heraion, Metroon, the various "Treasure-houses," the Exedra of Herodes Atticus, the precinct wall and gates of the Altis, the Stadium, the Bouleuterion, Prytaneion, Leouidaion, and Theokoleon. Of each of these are given ground-plans; where sufficient remains are extant, sections and restorations; and everywhere exact reproductions of all important architectural features.

It would obviously be impossible to even summarise briefly a field so wide, and, indeed, much of the discussion is necessarily of so minute and detailed a character as to be intelligible only when closely following the plates. It will better serve, therefore, and show more clearly the scope and character of the work, to select one building, and that, perhaps, in some respects, the most interesting, and summarise the deductions made from a minute examination of its remains. We select the Heraion.

The Heraion was a temple to which Pausanias, attracted by its age and many peculiarities, paid special attention. He tells us (v. 16, i.) that the Skilluntians built the temple about eight years after Oxyllus obtained dominion in Elis, hence, following Pausanias, we should have to date the temple about 1096 B.C.,—i.e., the time usually given for the return of the Herakleidae. To this it has always, from the outset, been objected that the existence of a peripteral temple with pronaos, cella, and opisthodomos was, in the eleventh century, B.C., an *a priori* improbability; further, that the masonry of that date was polygonal, and hence wholly different to that of the Heraion. Pausanias was, therefore, here, as so often elsewhere, quietly discredited. Pausanias nowadays is looking up as an authority. We are finding again and again that excavations confirm his statements, and that it is often our own inadequate knowledge of facts that constituted his apparent improbability. Such seems, according to Dr. Dörpfeld, to be the case as regards his statement about the Heraion. We know now that Tiryns and Mycenæ both had what is practically the plan of the *templum in antis*, only they used it as a megaron, with a portico; hence only the colonnade of the Heraion remains a feature to be accounted for. This may have been added to distinguish the house of the god from the house of the mortal. It was, in fact, like the superposition of a baldachino on columns over the

ordinary megaron. The suggestion is, at least, an interesting one, and as we have no extant temple of heroic times, cannot at present be disproved. Among all primitive peoples the house of the god is made after the pattern of the house of the man, only with ampler decoration. Further, as regards technique, the masonry of the Heraion is closely paralleled by some of the masonry at Mycenæ.

Thus, so far, there is nothing to forbid the accuracy of the date given by Pausanias.

But there is another means independent of Pausanias by which the probable date of the temple may be fixed. Of the wooden columns originally set up on the Heraion some probably fell away in the seventh century B.C., some in the sixth, and one was still standing in the time of Pausanias, and served its original architectural purpose of supporting the opisthodomos. This column then had lasted eight centuries longer than the others; no doubt it was the last put in. Now, it is not easy to say precisely how long an oak column of one metre in diameter would last in a particular climate, but this much is clear, the oak column that fell away in the seventh century B.C. (or even for certainty sake that which fell away in the sixth), must have been several centuries old, which would set the building of the temple back to the date which the statement of Pausanias requires.

This date is further borne out by the character of the votive terra-cottas found in the temple, and by the extant head of a huge cultus image. These, of course, cannot date the temple, but must rather be dated by it, but there is nothing in their style to make the date proposed impossible, or even difficult. On the other hand, the architectural terra-cottas are clearly of later date, and at first sight seem to contradict the theory, but there is nothing to prevent the supposition that they were added later. In fact, it is every way probable, that the roof was originally flat, and that the gables, with their terra-cotta ornaments, were a decorative feature added later.

Another question is raised and answered. Dr. Adler thought that the cella, with its pronaos and opisthodomos, was earlier than the colonnade: there are, according to Dr. Dörpfeld, several objections to this. The foundations of the cella and its walls are built of just the same masonry as that of the foundations of the colonnade; the material ("Muschelkalk," containing particular shells) is the same, and is rarely found elsewhere. Further, the step which runs round the cella is not polished on its outer (perpendicular) side, which would have been the case had the naos stood free. Lastly, the inner and outer (colonnade) columns are so arranged as regards their axes that they must all have formed at least part of one original plan by one and the same architect. This identical axial arrangement does not occur in cases where the colonnade was added by a different hand.

Turning to the later history of the temple, it is evident that it was subjected to constant changes,—the wooden columns were one by one replaced, probably as early as the seventh century B.C., the flat roof of air-baked bricks was supplanted by a pedimental roof of terra-cotta tiles. After the building of the temple of Zeus the importance of the Heraion steadily declined. No further considerable alterations were made, as probably only important local ceremonies associated with cults carried on by women took place there. It has been conjectured that in the early period of the Heraion the temple was dedicated conjointly to Zeus and Hera, and that it was only after the building of the temple of Zeus that it became strictly a Heraion. The conjecture is an interesting one, but lacks evidence, and it would have first to be settled whether the conjunction of Achaean and Eolic tribes which brought about the marriage of Zeus and Hera had already taken place, but this is a question for mythologists rather than architects.

For the rest, in late Roman times, the roof was destroyed and the tiles crumbled down and made a mass of *débris*, which covered the

* Die Baudenkmal von Olympia, bearbeitet von Friedrich Adler, Richard Borrmann, Wilhelm Dörpfeld, Friedrich Graeber, Paul Graf, Brste Hoffe. (Ein Band mit 72 Kupferstücken: gross Folio in Mappe, und ein Halbband Text 113 Seiten.) 4^o. Asher: Berlin.

interesting if Mr. Dowsett had—to take one example only—given us the decrease in value during the last ten years of houses in South Kensington and landed properties in Essex and Bedfordshire. Were these facts before him, it may be doubted whether a prudent man would, without careful thought, take Mr. Dowsett's light-hearted advice to capitalists "to put some of their money into land." The fact is that, so far as house property and residential land is concerned, this species of property is much more mobile, if we may use the expression, than it was a few years ago. The ease of transit, the growth of towns, and numerous other circumstances, raise or lower the value of this kind of property much more rapidly than was formerly the case. Hence an apparently prudent investment may in a few years change in value in a manner which it was not possible to foresee. So far as the attractions of land are concerned they are really greater than they were, since the size of cities and the rapidity of modern life have made the quiet and health-giving properties of the country and its amusements more sought for. Where, for instance, shootings and fishings are within easy reach of London or large towns they have greatly increased in value, and the demand for hunting boxes in the grass countries has enabled many a landed proprietor with diminished rent to pay his way. There was not, indeed, the least need for Mr. Dowsett and his fifty-seven assistants to set out the attractions of the country in order "to win hack capital to the soil." For they are thoroughly understood by thousands of men who have secured fortunes and by others who are on the way to do so. We are in the midst of a social change; the old order changes, giving place to new, but the change cannot take place in a day. Men cling tenaciously to estates which have been long in their family, and the supply of charming country estates thrown on the market is much greater than was formerly the case. Hence, in some instances estates are not sold which ought to be, and in others rich men pick and choose, so that some properties hang longer in the market than is agreeable to Mr. Dowsett and his professional brethren. In truth, there is accumulated wealth in the country sufficient for the purchase both of pictures and of land; a steady investment of cash in land is going on every year, and new men are becoming landowners. The great depression of English agriculture would have been much more keenly felt if this had not been the case. But certainly Mr. Dowsett and his team of fifty-seven writers are not likely to quicken the movement.

As we have referred to the absurd controversy (if it can be dignified by that name) which Mr. Dowsett started in the *Times* as to the relative advantages of purchasing pictures or estates, we may just add that Mr. Dowsett, judging from his letters, does not know what a picture means or what its object is. Mr. Rudyard Kipling amused himself, in a letter from Japan, with a half paradoxical suggestion that it was a better investment to travel and store up memories of real pictures in the brain than to buy "smears" on canvas; a humorous estimate of art which was probably never meant to be taken seriously. But it delights the mind of the estate agent, who comes forward with all gravity to urge that a real landscape, which is your own property, is much better than a few painted ones, and costs no more! Mr. Dowsett seems to think the object of landscape-painting is to give an illusory imitation of an estate. In that light it is certainly unsatisfactory; but we can assure him that it means a good deal more than that.

CHURCH BUILDINGS, WALTHAMSTOW.—At a meeting of the Building Committee and Trustees of the "United Methodist Free Churches," held at Walthamstow on the 3rd inst., it was decided to accept the plans and designs prepared by Mr. J. Williams Dunford, for the new church buildings proposed to be erected in Walthamstow. The total cost of the scheme will be about 4,000. Mr. Dunford has been instructed to proceed with the work at once.

whole building a mètre deep. It is to this we owe not only the preservation of many architectural fragments, but the admirable preservation of the Hermes of Praxiteles which was found embedded in the clay. The Byzantines built the temple up again roughly, and the old stylobate part of the walls and columns remained hidden and safe under the clay and their superimposed structure. They made use of the opisthodomos as a wine-cellar.

The site of the Heraion is a peculiar one: it stands, not as later Greek temples do, in a free and conspicuous open place, but wedged up against the hill Kronion. Part of its foundations had necessarily to be artificially made. This awkward situation must have been due to some original sacredness of the site, which probably held a very ancient shrine. In the south-west corner, as the excavations show, an ancient altar had originally stood.

Thus much of the Heraion,—of the remaining temples the conclusions drawn, though not always so novel, are not less interesting and important. The second volume of the "Baudenkmal" will be eagerly looked for, and not less so the sculpture volume, which, as the sculptures are so largely architectural, is the necessary supplement.

NOTES.



THE Trades Union Congress now being held in Glasgow had some very knotty questions to consider, and as the views of the delegates upon some of these vary considerably, there is plenty of scope for interchange of ideas. These meetings are seldom characterised by any backwardness in the expressions of opinion, nor do the delegates always evince that tolerance towards those who hold different views which is necessary for the harmonious conduct of the debates. The chairman of the opening proceedings on Monday, Mr. J. Wilson, M.P., probably had this in view in urging the delegates not to come to the Congress "full of egotism and dogmatism"; while it was also significant that an enormous hand-hell had been provided for the chairman's use. Fortunately, however, there are those among the Union representatives who combine tact with firmness; men of clear heads and strong common sense. The Congress this year numbers among its delegates the Parliamentary Secretary to the Board of Trade (Mr. Burt) and several other M.P.'s, and there is no doubt that the meeting at Glasgow will bring out the views of the leaders of the working classes on the great questions so closely affecting their interests. Besides what may be regarded as more purely "labour" questions, such as the eight hours' movement, several commercial subjects,—the decimal system, and other questions,—also find a place in the programme; and it is well that it should be brought home to the workers that such matters are of practical importance to them, in common with the rest of the community. The *Standard* would have been glad to see among the subjects put down for consideration the question of intimidation and violence employed by workmen against one another. Hardly a safe topic to introduce, perhaps, considering that intimidation is almost invariably employed by trades unionists. The *Times* admitted a most inflammatory letter to its columns a week or two ago, from a Derbyshire miner, the writer of which, alluding to certain political threats made use of during the recent contest at Newcastle, declared that if labour questions were obstructed in Parliament by Irish M.P.'s, the miners of this country would make it "as much as their lives were worth" to appear on an English platform. This is very deplorable, and affords a startling evidence of the illogical ground which men professing to be struggling for freedom are prepared to take up; while it also affords a very sufficient reason for the avoidance at the Congress of such subjects as that alluded to

by the *Standard*. We take it that the admission of the letter in question into the columns of the *Times* was by way of a grim joke, though no doubt the joke was lost on the writer of the letter.

A REMARKABLE theory about the Pantheon has been set up by a brilliant young French "prix de Rome" architect, M. Chedanne, and supported by M. Eugène Guillaume in a recent number of the *Revue des Deux Mondes*, to the effect that the rotunda is later, not earlier, than the portico, and is the work of Hadrian. We may have more to say on the subject, as the theory is put forth with so much solemnity and parade of evidence by its French supporters that it seems to challenge examination; but our present impression is that the circumstantial evidence offered is quite insufficient to support a theory which in other respects is so architecturally improbable, and that M. Chedanne has in fact yielded to the temptation which so often besets young and clever archaeologists in these days, of making a bid for reputation by propounding a new and startling theory in contradiction of the views of all previous students. The theory may not be ultimately tenable, but the propounding of it has the effect of drawing public attention to the propounder, and giving him a certain position which he might not have so quickly attained otherwise.

AS a general rule, nearly every Exhibition in the German-speaking countries has the prefix "International" to its name, no matter how diminutive may be the number of non-German exhibitors. The Munich Art Exhibitions have, however, generally had some right to the prefix, and this year the Bavarian capital can actually boast of having fully half the catalogue numbers attached to foreign names,—a combination of Prussia, Austria, and the minor German States being treated as the "home country." As far as architectural exhibits are concerned the Exhibition scarcely deserves attention, yet to show its international character, even in our neglected art, we may mention that Italy, Spain, Sweden, Holland, and the former Polish kingdom have contributed towards the dozen architectural drawings to be found in the non-German division of the show. To this dozen should be added another dozen by German authors, in which will be found such old friends as Bruno Schmitz's two designs for the national monument to the late Emperor William I., and Professor Raschdorff's design for the new Berlin cathedral, drawings which are somewhat damaged after the wear and tear of several exhibitions. Professor Durrn, of Karlsruhe, it is true, has sent some neat drawings of a new palace for the Grand Duke of Hessen, and for some new public baths, and Professor Schachner (an Austrian) has contributed a sketch of St. Peter's in Rome, but what are these few sheets in comparison to the resources of the countries represented? When Munich itself cannot obtain contributions from half-a-dozen architects in the city it might be well in future to do away with the farce of calling it an "architectural group," and to call it an "Exhibition of Oil Paintings and Sculpture." Three second-class Gold Medals have been awarded, a number quite out of proportion to the quantity and quality of the architectural work shown. One of these medals went to Professor Raschdorff for his Cathedral design, the second to Professor Schachner's sketch, and a third to some photo-lithographs of the new theatre put up at Brussels according to M. Baes' plans. If there had been drawings instead of photographs of the Brussels theatre this award would at all events have been popular.

THE opening of the Metropolitan Railway last week to Aylesbury completes the extension of this line. This opening was celebrated at a public banquet at Aylesbury, but it is a little difficult at present to appre-

ciate the great benefits which the working folk of Aylesbury expect to obtain from the new line. Already there are communications by means of the London and North-Western with all parts of England, and the journey to London is not appreciably shorter by the new line than by the old line. When the Manchester, Sheffield, and Lincolnshire have completed their extension, and begun to run over the Metropolitan line to London, Aylesbury is far too unimportant a town for fast trains to stop there. The fact is that the railway companies concentrate their best efforts upon the traffic between large centres of population, and this tendency must become more and more pronounced every day. A new line of railway necessarily adds to the convenience of persons who reside within a comparatively short distance from it. But it is perfectly evident, from the fact that this Metropolitan extension is ultimately to be a mere link in the system of the Sheffield Company, that Sir Edward Watkin has clearly perceived that the original scheme of an extension of the Metropolitan system only would not be a lucrative undertaking. Whether the still greater one upon which he has entered will, though larger, be proportionally a better paying line is exceedingly doubtful. It is certain to be made, but it will probably, like many of the great American railways, never pay its ordinary shareholders a farthing of dividend.

WE publish on another page a couple of sketches of the old buildings of Emanuel Hospital, the removal of which we fear must now be regarded as inevitable. In reference to the state of the building we may quote a portion of the letter written to the *Times* of Monday last by a correspondent who signed himself (prematurely it appears) "The Purchaser's Architect":—

"Each almshouse consists of an entrance lobby 3 ft. by 4 ft., opening into a room (living and sleeping room) about 16½ ft. by 12 ft. (average) and 10 ft. high, with a window 3 ft. 6 in. by 5 ft. front and back. Off this are two cupboards, and out of a winding staircase leads to a cellar of same size,—6 ft. 6 in. high,—lighted by a glazed door and two very small windows at rear. This cellar contains the sink and coal store. The walls are very wet, owing doubtless to there never having been a damp course, and, of course, the cellar is unfit to work in long. The floor is of cement. From this cellar access is given to the back garden, which is about 6 ft. below the level of the quad. There is no cistern or water-closet in the house. The sink is supplied with water direct from the main, but the supply is not continuous. The water-closet accommodation consists of one closet for each five houses. It is situated at the extreme corner of the site, so that the old tenants have a distance of from about 10 to 30 yards to walk to it through the rain or snow. As the tenants are very old, this distance, plus the winding staircase, is a difficulty. . . .

Of the twenty almshouses twelve are vacant. Separating the quad from the street is an iron screen or railing containing a large central pair of gates, and at the sides two wider gates. These gates are artistic in design, but their age is such that most of the hammered work is eaten through and is held up by straps. . . . The dwellings lack the commonest of sanitary essentials. If remodelled their archaeological interest is impaired if not destroyed. Such as they are they have always been, except perhaps that the w.c. was once a privy. The intrinsic value of the whole site is such that each tenement of one living room is worth about 2,000*l.*, which would build elsewhere probably fifteen similar but sanitary dwellings. The archaeological interest is of great value, but is surely subordinate to the vital interests and primary objects of the charity."

This is surely the common sense of the matter. As we have already pointed out to the owners, in selling what they do not want are not destroying the building; the responsibility for this rests with the purchaser. If any one, or any corporate body, can afford to buy the building to preserve it, we presume they can still do so. In the meantime "The Purchaser's Architect" assures the public that if his scheme is carried out, no ground now open will be covered, though of course the proposed new buildings cannot be expected to be restricted to one storey. The amusing point in connexion with the matter is that another architect has written to the *Times* under his own

signature to say that he thought he was the purchaser's architect, and asking the anonymous architect for an explanation. It is to be hoped that the misunderstanding may be settled to the satisfaction of both parties.

VISITORS to Cologne will be pleased to see the improvements which have been made in the vicinity of the cathedral by pulling down blocks of disreputable old buildings, and giving the historical old "Domplatz" a larger superficial area, and a more uniform appearance. At the same time, however, there will be a disagreeable impression caused by seeing the cathedral flanked on either side by two specimens of modern architecture, *i.e.*, a large new hotel and a spacious railway station, both apparently near their completion. The station, which has just been roofed in, will be one of the most remarkable in Prussia, as far as construction is concerned. The central span of the three which cover the dozen pairs of rails measures no less than 63 metres, the height being 24 metres, and the length 255 metres. The superficial area covered by this new station is 22,200 square metres, or about double that of Cannon-street station.

THE inhabitants of the Faubourg St. Germain are just lamenting the loss of a square of green trees and grass, the last remnant of the once magnificent park of the Hôtel de Luynes (built by Pierre LeMuet for the Duchesse de Chevreuse), which has been destroyed by the prolongation of the Boulevard Raspail. This street when completed will form one of the longest and most important new avenues in Paris, about 2,300 metres long, making direct connexion between the Gare de Sceaux and Boulevard St. Germain, not far from the Chamber of Deputies; but it has destroyed a good many old and interesting houses in its relentless march, including that in which the famous soirées of Madame Recamier were held for many years. On the other hand, the inhabitants of the right bank have just obtained a new square, near the Rue Monge, and on the site of the remains of the ancient "Arènes de Lutèce." M. Juste Lisch, who has directed the work since the death of M. Rupprich-Robert, has contrived to uncover and leave visible a portion of the ancient remains.

THE rapidity with which the buildings for the Chicago Exhibition are being erected is remarkable; but the rate of progress made there is entirely thrown into the shade by the haste with which the lofty buildings now so common in the large cities of the United States are being run up. The most recent example of this lightning rate of building is the Ashland block, a construction of steel, stone, and terra-cotta at the corner of Randolph and Clark streets, close to the City Hall, Chicago. This building, seventeen stories in height, was built in mid-winter. It covers an area of 140 ft. by 80 ft., its foundations being steel rails embedded in concrete, this method being adopted owing to the great superincumbent weight and the nature of the soil. The work of construction was continued day and night by relays of men, powerful arc lights being used at night. To enable the men to work in mid-winter, artificial heat was furnished by 100 Salamander stoves, and protection against the cold winds was provided by several hundred yards of thick canvas. About sixty iron and steel workers, 100 bricklayers and masons, and thirty-five terra-cotta setters were employed. The method of construction, in which large quantities of iron and steel are used, was first tried six years ago (and described in the *Builder* at the time), and nearly all the large buildings are now erected in that way, the only difference being that steel has taken the place of iron. The skeleton of steel for each floor is first erected, each column, girder, and rafter being lifted and placed in position by steam power, and

rivetted with red-hot rivets. As the stories rise, they are filled in with brick, stone, or terra-cotta, the whole weight resting on the steel structure. In the case of the Ashland block at Chicago, six floors were completed by December 6, and the steel skeleton for the next six stories was for the most part placed. By December 19 ten floors were completed, and the steel shell for three more stories was mostly in position. Thus the entire construction of four floors of a building 140 ft. by 80 ft., divided into numerous rooms, was built in thirteen days, or one floor in three days and a quarter. The demand for these enormously high buildings in Chicago of course arises from the fact that the business quarter of the city is somewhat restricted in area and space has to be obtained vertically; the reason for the rapid running up is just the same as the reason for working night and day shifts on London business buildings—the desire to handle the rents as soon as possible. On the whole, we admire the American method best, because it accomplishes its object most thoroughly, and architecture (in the true sense of the word) counts for nothing in either case.

IN our last week's number we printed a description of the Mackenzie mausoleum in Greyfriars churchyard, Edinburgh, and of its restoration under Dr. Rowand Anderson's superintendence. That burial-ground, which Queen Mary opened to the citizens, lies north of Heriot's Hospital and the church of the Old and New Greyfriars. It has a steep incline northwards, and is traversed by the line of the second city wall, built after the battle of Flodden in 1513. The larger monuments are ranged against the backs of the houses—including Candlemaker-row and the Grassmarket—which abut against the north and east sides. The tomb of Sir George Mackenzie, who founded the Advocates' Library, Edinburgh, lies at the back of the church; whilst around are the flat stones on which the Covenant was signed, together with a memorial to those whom Mackenzie persecuted. A tradition obtains that Knox once took refuge in a tomb within the enclosure; probably when his life was threatened, after the death of the regent Earl of Moray. On August 10, 1889, we adverted in a "Note" to the crowded and unfinished state of the Advocates' Library, and to various efforts that have been made within the past fifty years to secure its completion.

THE intended purchase of the ancient Hôtel de Sens by the municipal authorities of Paris appears to have been put a stop to, at any rate for the present, by the extravagant demands of the present owner, who appears determined to get full value for archeological sentiment. He has already sold the carved woodwork, the chimney-pieces, and most of the interior fittings which gave the chief value to the building, to various collectors, and now asks a million francs for the nearly bare walls, a bargain from which the municipality has not un-naturally recoiled. It is a pity they put off the purchase so long, and did not endeavour to purchase the building before it was so much despoiled. We may draw attention to the fact, however, that the Paris municipality is willing to spend money in the purchase of ancient buildings, under reasonable conditions, for the purpose of preserving them. If they ruled in London they would probably purchase Emanuel Hospital with that object. But if the London City Council proposed such a thing, what objections we should hear from virtuous economists and indignant rate-payers!

A RATHER amusing intermittent correspondence on the subject of the telephone is to be found in the *Times* of the last fortnight. The Duke of Marlborough, who, a year ago, was the advocate of free trade in this industry, and contended strongly for the possibility of a 10% rent instead of the 20% now charged, wrote to the *Times* on the 23rd

ult. a letter deprecating the wastefulness of competition, and even suggesting that a cheap telephonic service would not be an unneeded advantage since "the amount of unnecessary talking which would take place is somewhat inconceivable." This complete change of front has exposed him to attacks from both sides. On the one hand General Wehler points out that nothing has occurred since last year, except the amalgamation of the New Telephone Company with the National, to justify the Duke's change of opinion. On the other hand, Mr. Faithfull Begg, who was his chief antagonist in the former controversy, ironically congratulates him on having, on further study of the telephone problem, come to see "that those into whose hands the management had at last fallen, and with whom he is now associated, knew what they were about." To General Wehler the Duke makes no reply, perhaps because none was possible; but Mr. Begg's taunt evidently has gone home, and in Tuesday's *Times* it is indignantly repelled in a letter noteworthy at least for brilliancy and originality of metaphor. The Lion,—The National Telephone Co.,—and the Lamb,—The New Telephone Co.,—lie down together it is true; but the Lamb is not inside, and the Lion was induced to come to the arrangement lest the Lamb should grow into "a dangerous rival Lion,"—here surely the metaphor is somewhat strained. The 10% telephone was only a pistol held to the head of the old company by the new; at least this is the only obvious interpretation of the sentence. "Had we gone into rate-cutting as between the two companies it would probably have come to this. The 10% rate is now postponed indefinitely in the interests of the company's dividends." The rest of the letter is taken up with explaining to the readers of the *Times* that, while a single-line system will serve for a small area, it is useless "to talk over the Government trunks on, except in inaudible whispers, mixed with had language to the offending instrument," and that the lines of the National Telephone Company are mostly single overhead lines.

THE cholera scare seems to be of use to some people as an opportunity of advertising themselves. A sanitary engineer, for example, writes to a daily paper and, after repeating some of the best-known common-places of sanitation in a style of solemn warning, winds up with the remark that "as I am consulting engineer to the — Board, and was a competitor for various other schemes of drainage, I of course know all about it," or words to that purport. It is in this sentence that the pith of such a letter lies, which the daily paper innocently prints (without charge) as a communication made in the public interest.

THE British Institute of Public Health (formerly the "Public Health Medical Society") is instituting examinations for the purpose of giving certificates of competency to sanitary inspectors. One of the conditions is that the candidate, before being received for examination, shall produce evidence of having received practical instruction on the subjects of the examination; in other words he is not to use the examination as an opportunity for making a shot at a certificate by dint of good luck in making the best of desultory knowledge.

IN the *Revue Scientifique* for September 3 M. Zahorowski takes up a curious subject, "Les Chemins-de-Fer et l'Accroissement de la Taille," in which he asserts and supports by statistics the theory that there is a relation between the establishment of railways and the growth and development of the human figure, and that the tendency of the intrusion of a railway among a neglected and stunted population is to raise the standard of health and of stature all along the borders of the line. This, if true, is a curious and significant

comment on the hostile attitude assumed towards railways by Mr. Ruskin and other aesthetic philanthropists of the day.

MAGAZINES AND REVIEWS.

The *Gazette des Beaux-Arts* starts with an article by M. Reinach on the Sarcophagi of Sidon, among which he singles out as of special interest that one called the "Sarcophagus of Alexander," including a supposed figure of Alexander, as, if not the purest in taste, the most vivid, lifelike, and energetic in design. Illustrations are given of part of this "painted half-relief, or picture in relief," and of the head called Alexander, which is a remarkably fine and energetic head. M. A. Darcel contributes an article on "La Céramique Italienne," M. Paul Lefort discusses on some pictures by Vanloo and M. A. de Champeaux has a long article on "L'Art Décoratif dans le Vieux Paris," a fertile and fascinating subject, in which however M. Daly has been the forerunner; and indeed the best illustration in the article, the beautiful south door of the Church of St. Nicolas des Champs, is reproduced from his "Motifs Historiques." A long article signed "C. E." is given to the Vienna Theatrical and Musical Exhibition.

The *Art Journal* commences with the second of the editor's "Rambles in the Isle of Wight," with an effective etching of the old church at Bonchurch by Mr. Percy Robertson, who also contributes the other sketches which accompany the article. Mr. Aymer Vallance contributes an illustrated article on the artistic treatment of knives, spoons, and forks, with illustrations from old examples, not all of which are to be commended, though old, because in some cases the treatment of the handle is such as to make it uncomfortable to hold, and no handle is rightly treated of which that can be said. Mr. Claude Phillips continues his notes on "Summer Exhibitions at Home and Abroad," and Mr. H. M. Cundall his articles on "Our Provincial Art Museums," dealing in this number with Sheffield and Wolverhampton.

The *Magazine of Art* gives a critical article, with some illustrations of his works, on the late Nicolo Barahine, a modern Italian painter who is not much known as yet in this country. He designed, among other things, the mosaics over the doors of the Florence Duomo. Mr. Tilly's article on "Burmese Art and Burmese Artists" takes us also on rather unfamiliar ground, and the illustrations of ornamental detail are curious and interesting. "Copyright in Works of Fine Art" is the subject of an article by Mr. G. E. Samuel, solicitor; we observe that the consideration of architectural design is entirely omitted; we do not believe much can be said about copyright in architecture, but we might have liked to have had the views of the legal mind in regard to it. The number contains a translation of Maurice de Guerin's "Centaur," with powerful and original illustrations by Mr. Arthur Lemon, who has devoted himself especially to centaurs, a sort of animal more satisfactory to our thinking, in poetry and legend than in painting; when deliberately and realistically drawn they look too improbable.

The *Forthnightly Review* contains an article by Mr. Herbert P. Horne on "The Strand Improvements." Mr. Horne naturally devotes his attention principally to the architectural aspect of the proposed improvements, and he points out one defect in regard to the idea of making St. Mary-le-Strand the central feature seen down the new road from Holborn; viz., that the steeple of St. Mary is oblong and not square on plan, and that it would present its narrow side to the vista. This is a sound criticism, though we cannot agree with Mr. Horne in thinking that this shape on the plan is an architectural defect in itself; it appears to us, on the contrary, to add distinctive character to the steeple. Mr. Horne does full justice to the architectural importance of St. Mary's as the picturesque centre of the Strand vista, the feature which "lends distinction to the Strand, and adorns it as no other street in London is adorned." He suggests the southern end of the new street as a site for the County Council buildings, with the road diverging to fall into the Strand on either side of it. This is an idea worth consideration. Sir Robert Ball contributes an interesting article on Mars, in which he sums up dead against the idea of any possibility of communication signals, on various grounds for

which we must refer the reader to the article, and is very sceptical as to the existence of inhabitants in the planet, on the ground that intelligent life is only possible or probable during a certain phase of a planet's existence, and that Mars being so much smaller a globe than ours, must have gone much more rapidly through its phases and is now in quite a different period of its history from the earth. An article on "Cholera and Cleanliness in Russia," by Mr. E. B. Lanin, should rather have been called "Cholera and Filthiness in Russia" (only the alliteration would then be lost), and gives fearful revelations. Mr. F. T. Piggott contributes an interesting article on "New Japan," rather political and social than artistic; and Lady Dilke contributes a short article on Mulready, with some pleasant reminiscences of the painter.

In the *Revue des Deux Mondes* M. Henry de Varigny writes a long article on the very modern subject of "La Plinie Artificielle," in a somewhat sceptical spirit, but concluding with a wish to see further experiments carried on in a more strictly scientific manner. M. E. Gault's article on "A Voyage to Kibarezm" (one of a series of articles) contains much curious information on a region little known to European readers.

In the *Century* Mr. Van Brunt's articles on the architecture of the Chicago Exhibition are continued. Among the illustrations is a fine one of the "Golden Doorway" of the Transportation building, a very striking hit of architectural design for a temporary exhibition building. Another illustration shows a small and not very good view of the "Women's Building," the design of Miss Sophia Hayden, selected in a competition among lady architects. As far as one can judge from the illustration, it is a well-balanced and dignified design. A women's competition was also instituted for the sculpture of the main pediment, which was gained by Miss Alice Rideout. Mr. Theodore Robinson contributes an article on Claude Monet, the French Impressionist landscape-painter, and Mr. Stillman continues his articles on "Italian Old Masters," dealing this month with Tintoretto.

Scribner's Magazine contains an article of considerable interest to architects on "The Tilden Trust Library." Apparently the position is that the late Mr. Tilden left a legacy to build a great library for New York, which owing to some legal informality in the bequest has been for the present shelved; and Mr. Bigelow, the author of the article, devotes himself to a consideration of how it may be best planned and placed if it is ever carried out. The article is illustrated by a plan and elevations and a perspective view of a proposed design by Mr. Ernest Flagg, architect, which has high merits as an architectural design. The plan is arranged in the form of a Latin cross of an extreme length of 715 ft., with a large central hall which forms the leading feature in the exterior architectural design. The style is a free and picturesque treatment of Classic features. "The Nevsky Prospect," by Miss Isabel P. Haggood, is the sixth of the series of "great streets of the world," and deals with the banks of the Neva at St. Petersburg, and the aspect of the river itself when in winter it becomes a street. Mr. W. C. Bronnell contributes the first of a series of articles on "French Art," dealing with the "classic school" of the last and early part of the present century. The article evinces a broad and impartial critical spirit, and the writer urges the propriety of regarding this in many respects great phase of French art with sympathy, taking it from its own point of view, instead of condemning it because it is not in accord with the spirit of the present day; a caution much needed for modern art-criticism. "It is a sore mark of narrowness and defective powers of perception to fail to discover the point of view even of what one disesteems."

Harper's Magazine is unusually reticent this month on artistic subjects, the only article touching upon art being a short review (under the heading of "Editor's Study") of Mr. Montgomery Schuyler's "Studies in American Architecture," from which we gather that some thoughtful Americans (or one at all events) are beginning to be a little tired of the persistent effort of the modern American architect to be picturesque at any cost. "The attempt to Whitmanize architecture is not promising. The transference to the city streets of the bizarre constructions of seaside idlers gives our towns the aspect of a perpetual picnic camp-

ment. The carpenter's architecture when he did not know anything was preferable to his architecture since he has learned to be fantastic. Better decent monotony in form and colour than a town which looks as if it were struck with the jimjams." We rather expected it would come to that before long.

The *Nineteenth Century* contains an interesting article on "Globe-Trotting in New Zealand," by the Countess of Galloway, giving a good description of the country, and Mr. Johns' article on "Protective Colours in Animals" is an excellent contribution to the literature of this curious subject, which has an artistic interest in its own way.

In the *Westminster Review*, Mr. Stodart Dewey has an article under the rather ambitious title "A New Phase of Art," the main subject of which is the genius and works of the Swiss painter Boecklin, the key to which is that Art shall now take to interpreting "the laughter of man as he thinks over again his old conceptions of Nature and of life," the treatment of old classic subjects in a buoyant and humorous manner. Whether this deserves to be catalogued as a new phase of art may be questioned, but the writer succeeds in making us interested in Boecklin's work and desirous to know more of it.

Blackwood contains an article on "The Cyclone of April 29 in Mauritius," a vivid description by an eye-witness (Mr. Jerringham, the Lieutenant-Governor of the island) of the phenomena and the results of the cyclone. Here is a portion of the description:—

"The intervals of quiet were filled in by a roar and seething noise, such as the sea alone produces when lashed to fury, and an ominous thud, but of scarcely perceptible sound, announced that a portion of the roof had been carried away. All efforts, then, were directed inside, and the lights were lighted, while the remaining hurricane shutters were being closed to the south and west. The clanking of doors that would not close or were burst open; the hissing of the tempest through every chink; the cracking of glass panes and crashing of glass upon the floor, and the sea of waters that flooded the rooms beneath the roof-shorn wing of the house; the still falling, falling barometer, and the booming of the blast against the building, as if enraged at its withstanding the pressure as all—constitute a recollection not to be forgotten by the two occupants of Le Réduit and their three servants on that day."

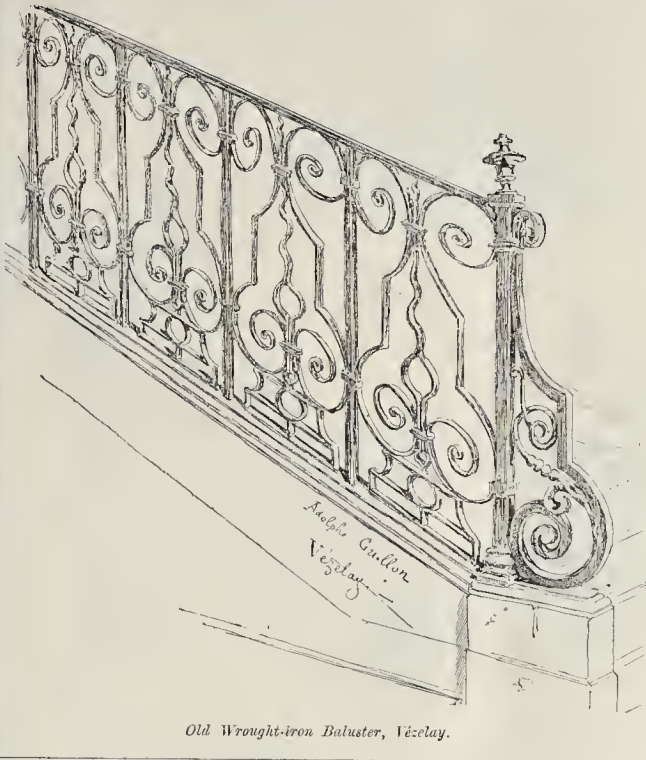
Mr. Holt S. Hallett, in the same magazine points out "the remedy for Lancashire," in the shape of a Burma-China railway, as a means of opening up a new market; an article which deserves serious attention. "A Reverie at Christie's," in *Longman's Magazine*, signed "A. L." (initials which one has no difficulty in recognising), is a moralisation on the interest and beauty of ancient bric-à-brac. "We can make telephones," says A. L., "we can get had news more quickly, we can litter continents with jam pots and sardine tins, but we cannot create the beautiful, we cannot make life splendid and graceful." The mischief is perhaps that we do not try, or care to try, or there is no knowing what we might be able to do. A. L. quotes Lowell as to the ugliness of American coins; "I am too loyal," he adds, "to refer to our own remarkable medals; our chief business with them is to get plenty of them."

To the *Gentleman's Magazine* Mr. G. Cadell contributes an article on "Trees," popular rather than scientific; the article by Mr. C. Parkinson, "Engraving in the Stones,—a Record of Worcester Cathedral," is an interesting and new way of looking at a monument of ancient architecture, tracing the geological history of the various stones employed in the building. We may recommend it to the attention of our readers as a thoughtful and original article.

Among the articles on special cities which are now becoming a fashion in periodical literature, that on "Barcelona" in the *Cornhill Magazine* should not be passed over. It contains some picturesque architectural description.

Temple Bar devotes an article to "A Stroll through a Great Cruikshank Preserve," the collection of prints in the possession of Mr. Burton, of Gloucester. The author admits that to the majority Cruikshank is a dead name, though maintaining that to the discerning view this is not and never can be the case. Perhaps not; but he will hardly persuade us but that Cruikshank, whether as artist or moralist, was much overrated by his generation.

The *English Illustrated Magazine* this month contains nothing of special interest to our readers except the agreeable little sketches of



Old Wrought-iron Baluster, Vézelay.

Timber Piles.—The old pier having been constructed entirely of timber, it became necessary to reinstate portions thereof from time to time; and with these repairs the pier has lasted sixty years, showing that timber is more lasting for such work than is sometimes imagined. It was not possible to identify with certainty the original timber, but some of the piles were remarkably sound in the portions below the mud-line.

Cast-iron Screw-Piles.—In the new pier the piles are of cast-iron, 8 in. diameter externally and 1 in. thickness of metal, except those for the promenade, which are only 7 in. diameter and $\frac{3}{4}$ in. thickness. The average length measured from the top of the head to the point of the screw is 40 ft. They were cast in four lengths, including the making-up piece at the top. The head was cast separate, so that it could be slipped over the pile, and thereby assist in meeting the variation of length which must necessarily occur in putting down screw-piles. The joints to the piles were flanged, planed, and turned at their bearings, and secured at each joint by six bolts of 1 in. diameter. The screws to the 8-in. piles were 2 ft. 9 in. diameter and 5 in. pitch; those to the 7-in. piles were 2 ft. 6 in. diameter and the same pitch. It is always a difficult matter to determine the best form of screw, because so much depends upon the nature of the soil; and in the present case the result has been highly successful, enabling the piles to be got down satisfactorily in every way. It was decided that they should be screwed at least 5 ft. deep into the solid ground after passing through the mud. This depth was considerably exceeded in many cases, the practice being to keep on screwing until the piles would not move any further.

Bracing.—The bracing to the piles is of two kinds, horizontal and vertical diagonal. All the piles in the main body of the pier and in the arms are so braced, but the promenade and widening are braced with the vertical-diagonal bracing only. The horizontal bracings are of channel iron weighing 9 lbs. per foot-run, placed about 1 1/2 in. apart, with seven cast-iron distance pieces fixed by 1/2-in. bolts; these bracings are secured to the piles by wrought-iron straps, 3 in. by 1/2 in., and bolted together by 3/4-in. bolts. The horizontal bracings are stiffened by diagonal ties of channel iron of the same section, bolted to the web of the horizontal bracings. The total length of these horizontal bracings is four miles. The vertical bracing is of 1 1/2-in. round iron: one end of each bar is forged flat, and bolted by 1 1/2-in. bolts to the wrought-iron straps round the pile heads, and to the horizontal channel iron that forms the horizontal bracing; the other end is a screw with two hexagon nuts, passed through a tension ring of cast steel 9 in. inside clear diameter. The total length of these vertical bracings is two miles and a half. They are applied only transversely, and there is no longitudinal bracing vertically.

Decking.—The main girders run longitudinally and form a continuous tie from end to end. They are supported on the pile heads by cast-iron chairs or stiffening pieces, and are bolted thereto by 1-in. bolts, the stiffening pieces being also bolted to the pile heads by four 1-in. bolts to each head. The span is 20 ft. from centre to centre of pile, this being considered the most economical. The main girders are of rolled I iron 18 in. deep by 7 in. wide, and weigh 83 lbs. to the foot-run. The outside girders are only 12 in. by 6 in., weighing 56 lbs. per foot-run; and these to the arms of the pier 12 in. by 5 in., weighing 42 lbs. per foot-run. The whole of the girders are level on the top flange, the difference of depth being made up by pile-caps cast specially. The floor girders run transversely, except for the last bay at the extreme end of the pier; their section is 9 1/2 in. by 4 1/2 in., weighing 29 lbs. to the foot-run. They are bolted to the main girders, being placed 5 ft. from centre to centre; this distance was adopted in consideration of the quantity required for covering such a large area as upwards of two acres. The total length of floor girders is 3 1/2 miles.

Upon each of the cross girders a wood plate is bolted to the top flange, and a camber piece is fixed thereto rising to 6 in. in the centre on the head of the pier. The flooring is of pitch-pine 2 1/2 in. in thickness, laid close with iron tongues at the head of the pier, and with open joints for the promenade and other portions. The moving load allowed for was 140 lbs. per

street architecture, by Mr. F. G. Kitton, which diversify the article on "Doncaster and the St. Leger."

The *Antiquary* mostly continues the serial articles, in progress in its pages, to which we have already called attention in referring to previous numbers.

WROUGHT-IRON BALUSTER, VÉZELAY.

This is a sketch of a stair baluster in one of the old houses in Vézelay, by M. Guillon, a French landscape-painter who takes also a great interest in architecture, and to whom our readers have before been indebted for sketches of old French work of various kinds.

THE NEW ROYAL PIER AT SOUTHAMPTON.*

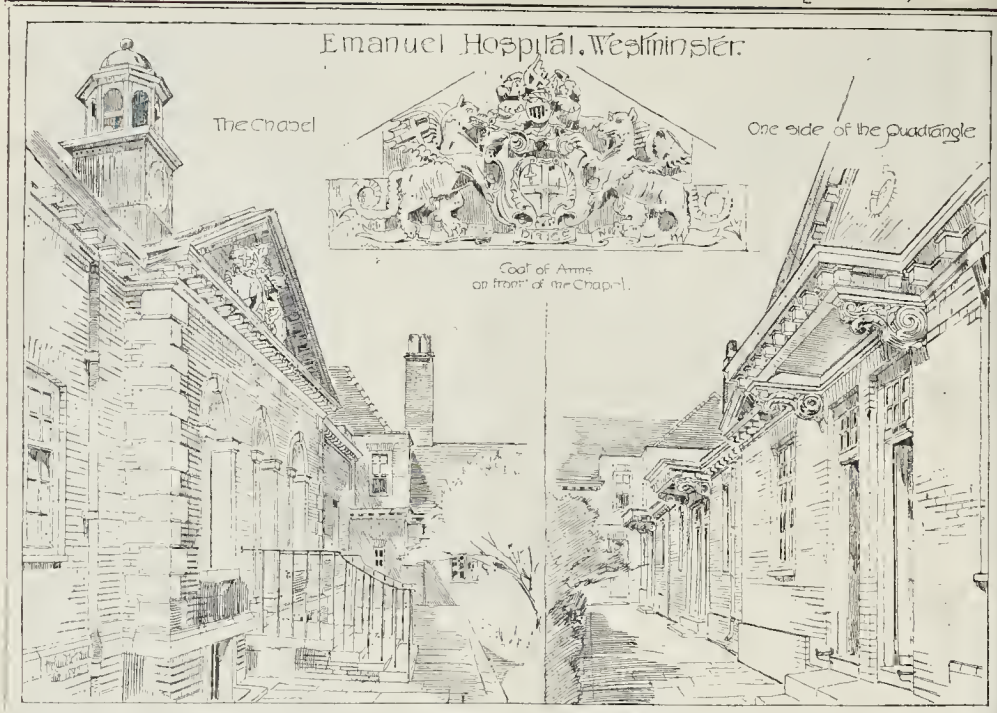
Old Pier.—The Old Pier at Southampton was opened by Her Majesty the Queen, when Princess Victoria, on July 8, 1833. Since that time the increasing trade and prosperity of the town have rendered it necessary to erect for pleasure traffic a new pier adjoining, reserving the old pier for commercial purposes; but during the progress of the works it became necessary to reconstruct the old pier, so that the whole is now an entirely new structure.

New Pier.—The New Pier just completed is the largest in the South of England, covering an area of 3 1/2 acres. It provides landing-stages for ten steamers, so that ample provision is made for the ordinary passenger traffic to and from the Isle of Wight, and for the excursion traffic to and from Southsea, Bournemouth, Weymouth, and other places. The commercial traffic is also well provided for, so that goods, cattle, and sheep can be landed at all times of the tide.

General Description.—The pier is constructed upon cast-iron screw-piles, on which are bolted main and cross girders of rolled iron; the object being to obtain lightness, strength, and durability, and not to impede the water-way.

* A paper by Mr. James Lemon, M. Inst. C. E., Mayor of Southampton, read at Portsmouth at the recent Portsmouth meeting of the Institution of Mechanical Engineers.

The entrance buildings are of white brick and stone, affording accommodation for a large traffic of passengers and visitors. The entrance-gates for the horse and carriage traffic are on the east side, and the roadway is extended to the pontoon bridge. The cattle and sheep entrances are still further to the east, and are kept entirely distinct. Immediately inside the main entrance is a paved quadrangle 80 ft. by 50 ft. throughout, in the centre of which is an iron column carrying the electric light. Then follows the promenade or approach to the head of the pier, which is 780 ft. long and 20 ft. wide, having alcoves on the west side fitted with seats and plate-glass screens. At the south end of the promenade is the head of the pier, 250 ft. long by 26 1/2 ft. wide; in the centre is a large and lofty octagonal band-stand, 25 ft. diameter, enclosed by covered seats, the whole occupying an area of 5,800 square feet, and seating 204 persons. From each side of the pier-head branches out an arm, 185 ft. long with an average width of 33 feet, for enabling passengers to land from the steamers or to embark therein. Ordinarily passengers will land upon the deck level; but spacious landing places are provided at two lower levels for enabling them to land both at ordinary and at extraordinary low tides. On the west side of the pier is provided a commodious landing-place for passengers from yachts and from small boats, serviceable at all tides. The pier-head commands a full view of the Southampton Water; it is fitted with seats for upwards of 400 persons, and accommodates also a club house of the Royal Southampton Yacht Club. The commercial traffic is confined to the site of the old pier. Goods, cattle, and sheep will be landed at the pontoon, and will pass along the carriage road to the town; and sheep and cattle for embarkation will be penned in a special area provided for the purpose at the pier entrance. Through communication between Southampton and the Isle of Wight has been amply provided for by the South Western Railway Company and the Isle of Wight Steam Packet Company, passengers being brought upon the pier by the railway without changing carriages; and spacious stations for arrival and departure have been erected on the pier. Electric lighting has been substituted for gas over the whole of the pier.



square foot upon the main portion, and 112 lb. upon the promenade.

Pier Arms.—In the construction of the arms of the pier the principle adopted is to use the cast-iron piles as supports for the decking and landings, and to place all the wood piles and bollards entirely independent of the iron structure, so that the concussion of the steamers is taken by these wood piles, and not by the iron structure. The wood piles are braced to one another both horizontally and vertically, at angles of about 45 deg. The ends of the pier arms are constructed of greenheart in lieu of iron, the better to receive the concussion of vessels. The timbers are also of greenheart or jarrah wood, with the exception of the fender piles, which are of Memel cressoted. The rubbing pieces to the fender piles are of American elm, and the skidding-irons thereto are of convex bar rolled iron, 6 in. wide and $\frac{3}{4}$ in. thick.

Landings.—The landings are placed at two levels, to meet the variations of tide. They consist of cast-iron gratings $1\frac{1}{2}$ in. thick, cast in sections 4 ft. 8 in. by 3 ft., and supported on rolled-iron girders. The total area is about 2,000 square feet to each arm, or 4,000 square feet to the two, so that ample space is provided for a large traffic.

Carriage Road.—The carriage road is constructed with Lindsay's steel-trough decking, weighing 16 lbs. per square foot, supported by steel girders $15\frac{1}{2}$ in. in depth by 6 in. in width, and weighing 62 lbs. per foot-run. Steel girders were adopted on account of the increased moving load here allowed, amounting to 2 cwts. per square foot. The span of the girders is 20 ft., and of the trough decking 14 ft. The decking is covered with a coating of tar and pitch on the upper side, and is painted underneath. The roadway is formed of gravel laid upon Portland cement concrete, with a fall from the centre to the sides to facilitate under-drainage.

Weight and Cost.—The total weight of the ironwork, including both cast and wrought iron and steel, is about 1,600 tons. The total cost of the work will be about 40,000. The new pier was opened on June 2 last by H.R.H. the Duke of Connaught.

The engineers of the work are the author of this paper and Mr. E. Cooper Poole; and the contractor is Mr. Henry I. Sanders. The electrical engineer is Mr. J. G. W. Aldridge, and the contractor Mr. F. Shalders.

EMANUEL HOSPITAL.

WE give these sketches as a record of this interesting old building, which will probably soon disappear. The original hospital was founded, according to Mr. Wheatley's Dictionary of London, in 1594, under the provisions of the will of Lady Dacre, the sister of Thomas Sackville, Earl of Dorset, the well-known Elizabethan poet, for the relief of aged paupers. The Hospital was rebuilt in the reign of Queen Anne. Some further remarks in regard to the present building will be found under the heading of "Notes."

Illustrations.

PAVILION, BARODA MUSEUM.

ONLY those architects who are fortunate, or unfortunate, enough to have practised in India fully realise the difficulties of building in that country. The workmen obtainable are, under proper guidance and supervision, capable of producing work in all respects equal to the best work produced in former times, but such work is much too costly to be lavished on mere works of utility, something cheaper is justly demanded, and something cheaper must be supplied. What is that something to be? Unfortunately, modern Indian works, in common with the political and economical institutions of the country, suffer from the indiscriminate, and frequently ignorant, criticism of travellers. It was easy to see that the style of art (save the mark) introduced by the British into India was bad; neither did it require profound wisdom to point out the beauties of native architecture, and to suggest a revival; but it did not seem to occur to these critics that men who designed objectionable masses in styles with which they were more or less acquainted would have much less chance of success in styles not yet subjected to critical analysis and study; and although a few commendable buildings designed by architects are dotted over the country, most of the revivals, especially those designed by natives, are infinitely worse in their way than their Palladian predecessors; the shortcomings of the latter were, indeed, less glaring, owing to the absence of any standard of comparison, but in the modern native work one has only to walk into

the nearest Bazaar to find, in some old oil or glue shop, the original of the moulding so ruthlessly distorted. This is not the fault of the workman, who would much rather finish his work highly; the fault lies with the public, who ignorantly command these revivals.

The problem to be worked out in India is a counterpart of the problem being worked out in Europe, and may be divided into two parts, the builder's part, and the artist's part.

First, from the builder's point of view the parts of a building must be so arranged that the various rooms are well proportioned, conveniently situated, and well lighted and ventilated, and the materials must be used both scientifically and economically. Secondly, comes the artistic part, which consists of making the whole thing *look well*, by the adoption of some system of ornamentation which will be recognised by members of the profession as harmonious and legitimate. Although it is impossible to put this in words, every architect knows what it means.

The architect of the pavilion, of which we this week give an illustration, lays claim to no purity of style, but he claims that he has endeavoured to attack the problem, in this and other buildings designed by him, from the only standpoint which appears to him to render advance possible.

The building, which is about half finished, is being constructed at Baroda for his Highness the Gaekwar, and is intended to accommodate technical classes, a museum, and a library. Advantage will be taken of a large stock of broken Minton floor tiles to cover the surface with mosaic panels, after the manner of the Mooltan and Lahore work.

The drawing, which was recently exhibited in the Royal Academy, was executed by Mr. Chisholm.

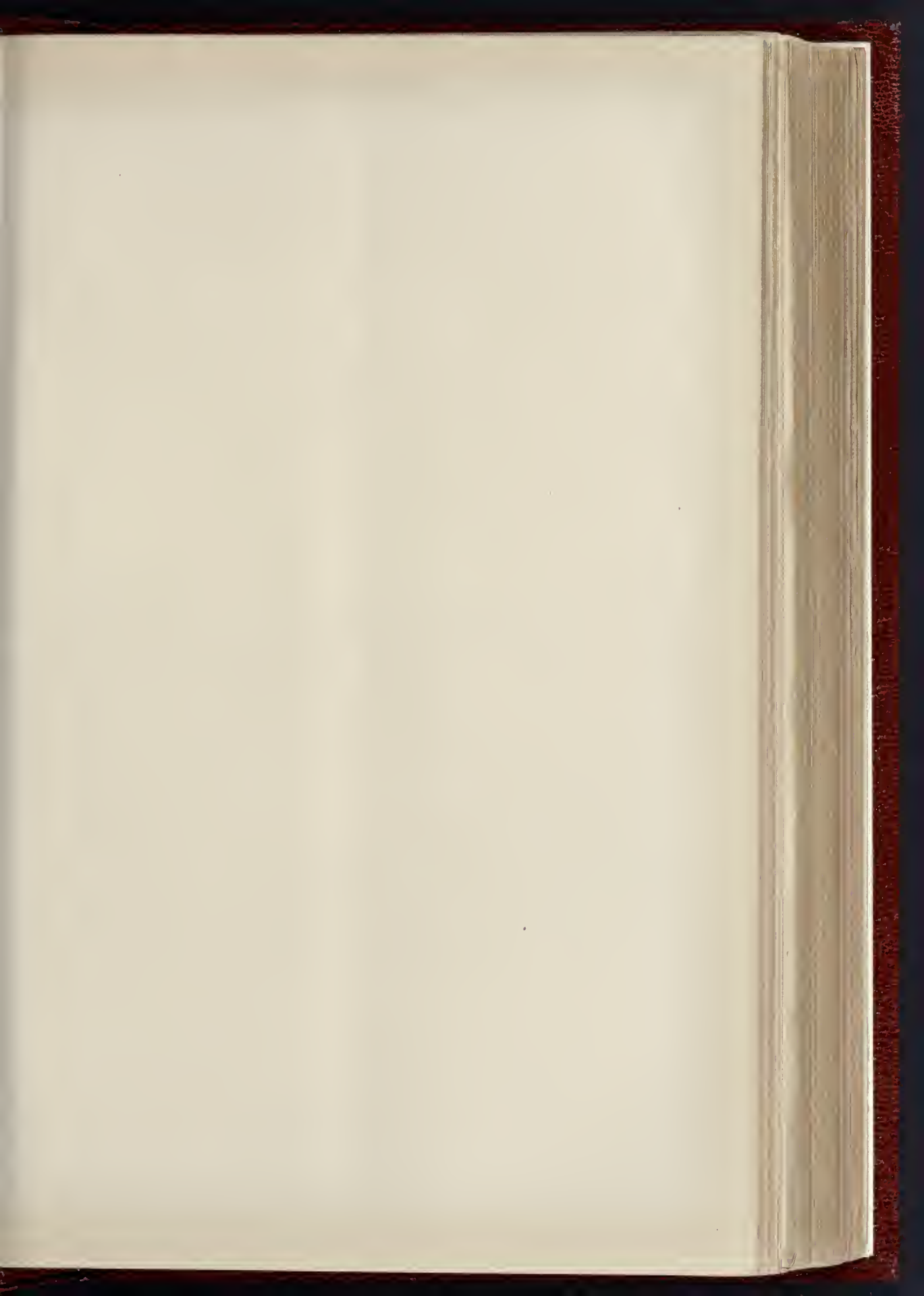
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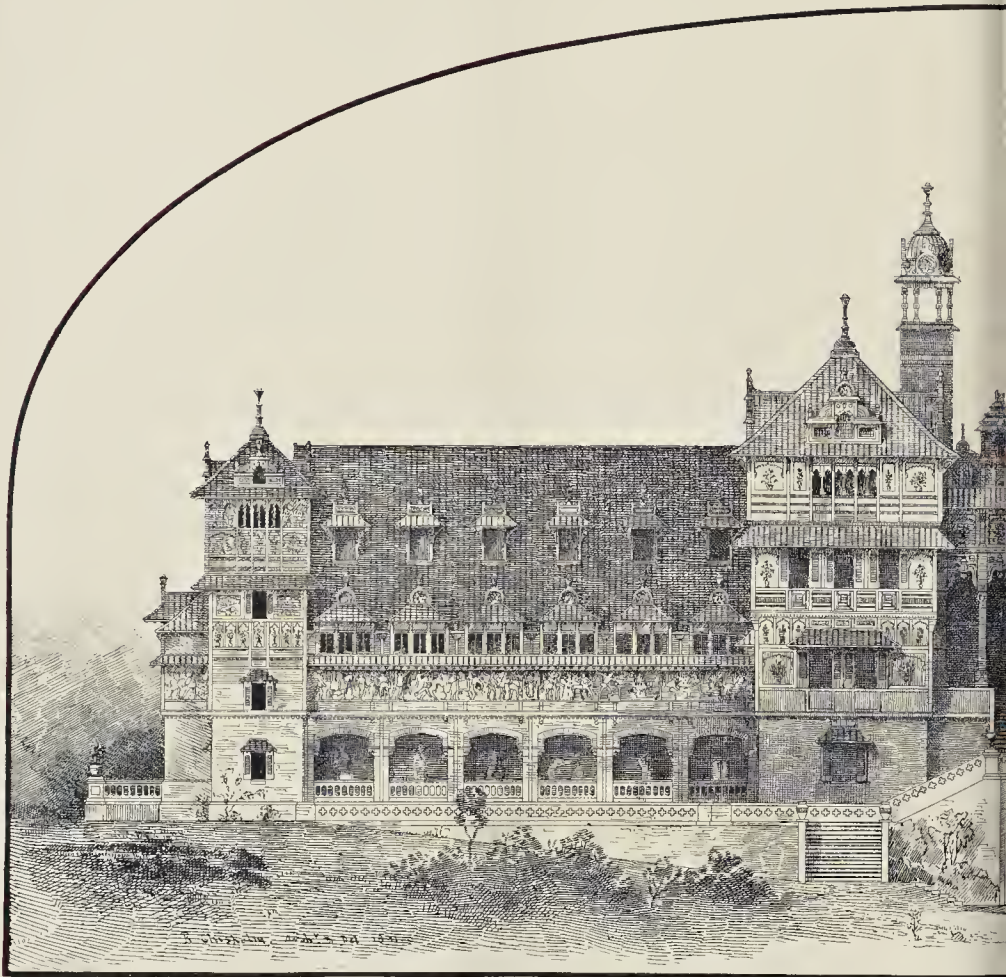
CONGREGATIONAL CHURCH, ASHTON-UNDER-LYNE.

THIS building, which is now in course of erection, will provide accommodation for nearly 1,200 sittings.

The church and spire (185 ft. high), when completed, will form a very conspicuous feature in the district, especially as the site is on high ground.

The outside of the building is faced with dressed Darley Dale stone, and the interior is of red stone from the Carlisle quarries. The





- SCALE - 8 - FEET - TO - AN - INCH -



PAVILION OF MUSEUM, BAROQUE

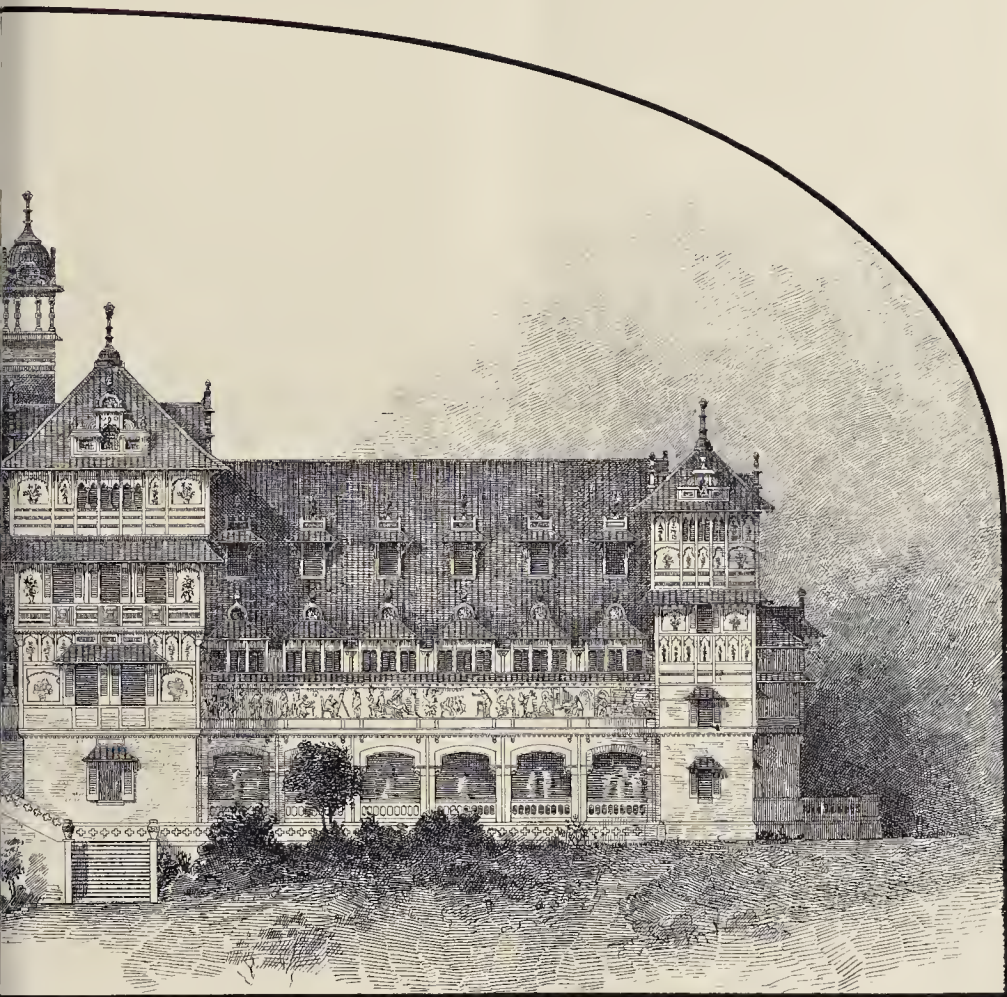
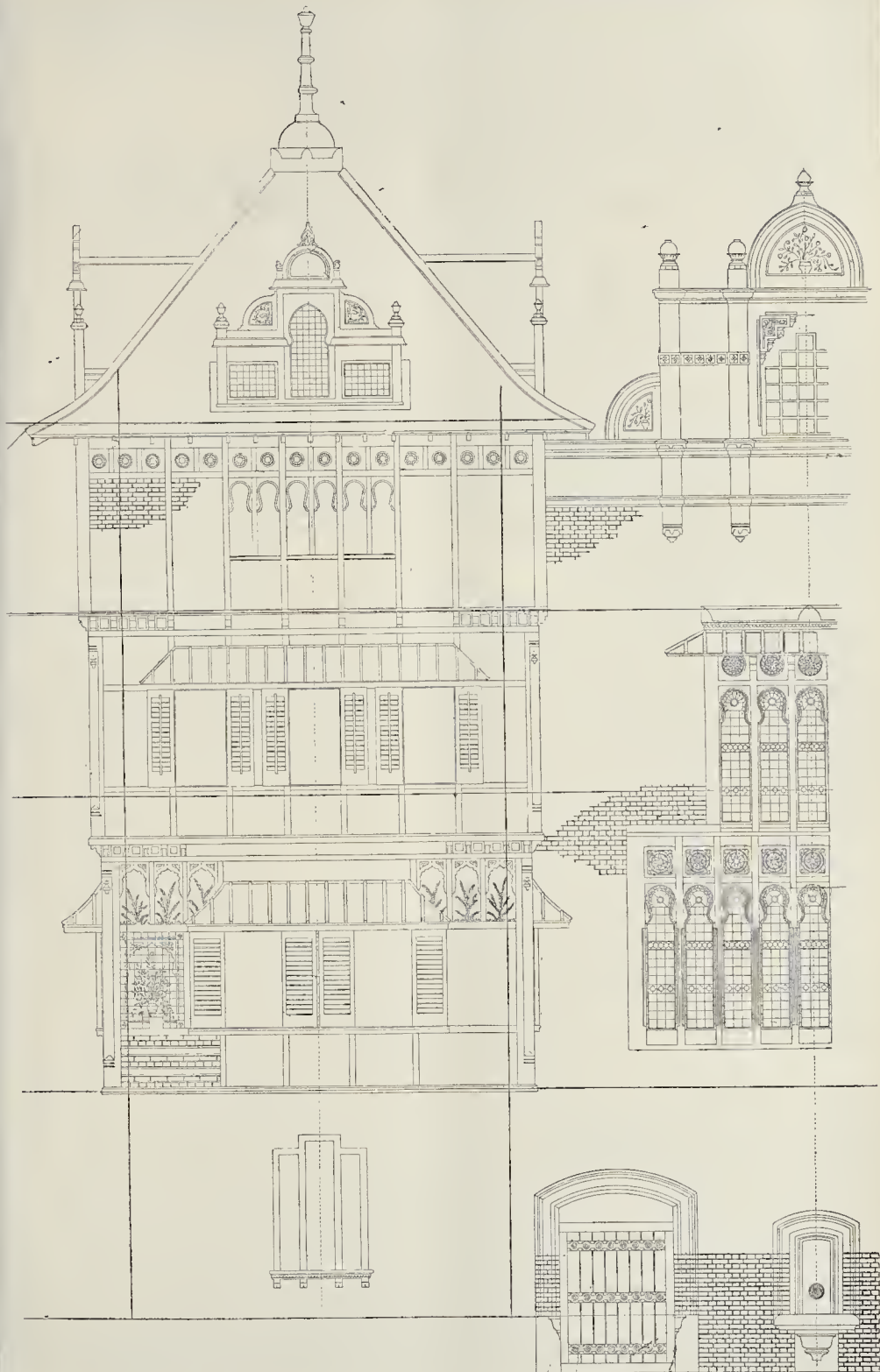


PHOTO-LITHO. SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

CHISHOLM, F.R.I.B.A., ARCHITECT.



Pavilion of Museum, Baroda. Part of Detail Elevation.—Mr. R. F. Chisholm, F.R.I.B.A., Architect.

roofs will be covered with grey Westmoreland slates.

The seating and other furniture will be of Dautic oak, and the hammer-beam roof over the nave will be one of the largest spans in the county, being 45 ft. clear.

The total cost of the church will be over 30,000*l.*, of which amount more than two-thirds is subscribed by Mr. Ahel Buckley, J.P., a resident in the neighbourhood and member of the congregation.

Mr. John Brooke, of Manchester, is the architect, and the builders are Messrs. Treasure & Son, of Shrewsbury.

The drawing from which the illustration is taken was exhibited in the Royal Academy Exhibition of this year.

THE CLOPTON CHAPEL, STRATFORD-ON-AVON.

THE chancel of the parish church of Stratford-on-Avon has been very recently restored and re-opened after having been closed upwards of two years. The work has been carried out under the superintendence of Messrs. Bodley & Garner.

The quaintly-carved miserere seats, which are of the fifteenth century, have been cleaned and restored, handsome oak panelling being placed above the stalls and extending to the window-sills. The floor of the chancel has been repaired; the tomb of Dean Balsall, Warden of the College of the Holy Trinity in the Borough of Stratford, who rebuilt the chancel, and died in 1491, has been carefully restored.

The process of heating the chancel has been successfully carried out. Upon the top of the high altar, the original altar stone has been placed, which was discovered last year upon the site of Thomas à Beckett's chapel at the east end of the south aisle of the church. Four beautiful memorial stained-glass windows have been recently fixed, leaving only one window in the chancel to be filled in.

The Clopton Chapel at the east end of the north aisle of the church has been restored by Sir Arthur Hodgson, of Clopton House, Stratford-on-Avon, under the careful supervision of Messrs. Butler & Heaton.

Under a Gothic arch in this chapel, for many years used as a pew, is the altar tomb of Sir Hugh Clopton, Lord Mayor of London in 1492, who died in 1496, and among other monuments of the Clopton family one is erected to the memory of the Earl of Tolness, Baron of Clopton, and his Countess, daughter of William Clopton, two life-size monument figures in alabaster and coloured to represent life. The Earl, who was Commander-in-Chief in Ireland *temp.* Queen Elizabeth, died in 1629, and his Countess in 1636.

Sir Edward Walker, whose only daughter married Sir John Clopton, and who was Carter King-at-Arms, *temp.* Charles I.—Charles II., is also buried in this chapel, his epitaph, in Latin, having been written by Sir William Dugdale, the celebrated antiquary and Warwickshire historian.

The monuments and figures have been very carefully restored, the old colouring reproduced, and the alabaster and stonework renewed where necessary. The window overlooking the chapel has been filled with tinted glass.

The monuments in this chapel had not been touched since 1714, when Sir John Clopton beautified and restored them.

BURNS MEMORIAL STATUE, AYR.

WE give an illustration this week of the statue which has been erected to the memory of Robert Burns, in the town of Ayr, with which he was so closely connected, and which he has commemorated in one of his most celebrated poems by the flattering couplet,—

"Auld Ayr, when ne'er a town surpasses
For honest men, and bonnie lasses."

The statue is by an eminent Scottish sculptor—Scottish by birth though now English by residence and adoption—Mr. G. A. Lawson, who has studied various portraits for the likeness, and has adopted a costume such as was probably worn by Scotchmen of Burns's rank of life in his day. Another lithograph gives the architect's detail drawing of the pedestal, which was exhibited at the architectural room of the Royal Academy this year, and is an instance, of which we hope we shall see more in this country, of proper thought and design being bestowed on the treatment of a

pedestal for sculpture. It was designed by Messrs. Morris & Hunter, architects, and executed in granite from the Kemnay Quarries by Mr. Taylor, Aberdeen. In height it is 12 ft. 3 in., the size of the base being 12 ft. The lower part of the die has a space on each side for a bronze bas relief, to consist of subjects from the poet's works. Between the die and the main cornice there is a sculptured frieze, worked from models prepared by Mr. David McGill, gold medalist, South Kensington, who is a native of Kilmarnock. The frieze is in the form of a ribbon springing from a serpent, the symbol of eternity. This ribbon, which is carried uninterruptedly round the pedestal, has cut upon it the names of all the places at which Burns at various times found a home, beginning with Alloway in 1759, and going on to Mount Oliphant, Lochlea, Kirksowald, Mossiel, Edinburgh, Ellisland, and finally Dumfries, the period spent in each being indicated by the dates. The decorative background of the frieze is intended to symbolise Burns's power over the English speaking race. In the front frieze the background represents the thistle of Scotland, in the next the rose and shamrock are combined as representative of England and Ireland, and in the third the palm leaf indicates India and the Colonies, while in the fourth the hawthorn or mayflower is utilised to represent the North American continent, which, it seems, has now recognised national floral emblem. In the absence of this desideratum the mayflower has been selected as recalling the close connexion of America with this country, which had its beginning with the landing of the Pilgrim Fathers. The statue is 9 ft. 1½ in. high, the total height of the monument thus being nearly 21½ ft.

COMPETITIONS.

MANCHESTER NEW TECHNICAL SCHOOL.—At the monthly meeting of the Manchester City Council, held at the Town Hall on Wednesday, the report of the Technical Instruction Committee in relation to the new Municipal Technical School was adopted. It was stated that there were twenty-six sets of plans received by the committee in response to their invitation to architects throughout the country. The plans approved were those of Messrs. Spalding & Cross, of 15, Queen-street, Cheapside, London, to whom the premium of 200*l.* had been awarded. The second premium of 150*l.* was awarded to Messrs. Gibson & Russell, of 11, Little Queen-street, Westminster; the third (100*l.*), to Mr. Ernest Rintz, 22, Moorgate-street, London; and Mr. Frederic R. Farrow, 2, New-court, Carey-street, London; and the fourth (75*l.*), to Mr. Theodore Sington, Oxford-street, Manchester.

TOWN HALL, LLANELLY.—A special meeting of the Llanelly Local Board was held on the 31st ult. to consider the report of Mr. Charles Barry, the assessor appointed by the Board to examine and select the two best plans from the twenty-five received for the proposed new Town-hall and municipal buildings, the site of which has been selected in the People's Park, whilst the cost has been fixed at about 10,000*l.* Mr. Barry's report stated that he spent two days in examining the twenty-five designs which had been sent in, and he awarded the first prize to the designs marked "Motto Equity," and the second to those under the motto "Falcon." The authors of both plans expressed the belief that their designs could be carried out for 10,000*l.* The members then inspected the two successful plans, after which the clerk opened the letters bearing the titles of the above mottoes, when it was found that the designs marked "Motto Equity" were those of Messrs. Simon and Tweedy, Edinburgh and Manchester, and the designs of "Falcon" proved to be those of Mr. William Griffiths, architect and surveyor, and agent to the Gellywernen Estate, Llanelly. It was then decided to send the first premium of fifty guineas to Messrs. Simon and Tweedy, and the second of twenty guineas to Mr. W. Griffiths. The former architects' fees for carrying out the work were the usual five per cent., and those of the latter were four per cent. A proposal was then made that the plans should be open for the inspection of the public, but an amendment that they should not be exhibited without the consent of the competitors was carried by ten votes to four. A discussion followed as to whether the board was bound to accept either of the two successful plans, but the opinion of the members varied,

and it was proposed that the matter be adjourned for a week. The members would thus have an opportunity of comparing the plans. The amendment was carried by ten votes to four.

Books.

Illustrated History of Furniture, from the Earliest to the Present Time. By FREDERICK LITCHFIELD. With numerous illustrations. London: Truslove & Shirley. 1892.

THE history of furniture is far too large and complicated a subject to be treated in a single volume of about 250 pages, of which a great portion of the space is occupied by illustrations. An outline of the subject might be given within those limits, a kind of introduction to the further study of it, treated in a systematic and concise manner. Mr. Litchfield's book can hardly be classed as such; it is a book about furniture arranged chronologically, but certainly not forming a comprehensive review of the subject; it rather suggests the idea of the illustrations having been selected first and the book written up to them. "Ancient Furniture" is treated in what the author admits to be a mere introductory chapter, and we then go to the middle ages, and thence to the Renaissance and modern times. Many of the illustrations given are interesting in themselves, notably the interiors of rooms from ancient pictorial representations; others are not quite worthy, in style of execution, of the works which they illustrate, and they follow each other in rather a mixed and random fashion, without any principle of arrangement being apparent. The author seems to have confined himself to illustrating changes in style of work and decorative treatment, but without going into the subject from the point of view of structural design, which is as important an element in furniture as in architecture. The only satisfactory and complete way of treating the subject would be to consider the practical object and structural conditions of each of the important types of furniture,—of which the leading ones are a table, a chair, a bed, and a cupboard or cabinet,—and to follow the changes in the idea and constructive principle of each type of furniture in successive periods, at the same time with the variations in decorative treatment; which latter, it must be observed, are not special to furniture, but represent the general decorative taste of the day applied to furniture as to architecture and surface decoration. It would have been quite possible, with system and concentration, and by selecting a limited number of typical examples, to have produced a small hook on the history of furniture which would have formed a comprehensive and satisfactory outline of the subject.

Mr. Litchfield's book shows no such attempt at a systematic treatment of his subject, it is in fact merely a creditable piece of book-making including a number of illustrations of various articles of furniture, forming rather a heterogeneous mixture, and accompanied by a running commentary which rambles about the subject in a desultory manner, the general chronological order being the only system observed. The portion of the subject which is best treated is the French and English eighteenth-century work, and of course that is the portion of the subject of which most is generally known and which at present interests English readers more, probably, than any other. The author is to be credited with doing justice to the good taste of Sheraton's early work, which, as has been pointed out in these columns, is in true taste much superior to Chippendale's, and he notices the change for the worse in Sheraton's taste as it became influenced by the French taste of the Empire. This is, however, about the only piece of critical analysis that we have noticed in the book, in which things in good and bad taste are illustrated without much effort to discriminate, or teach the reader to discriminate, between what is good and bad, true and false. Such a thing as the carved frame by Radspieler of Munich, given on page 247, is vulgar to a degree, however cleverly executed; but it does not seem to incur any censure from the author. Some of the 1851 Exhibition furniture (old "blocks" of which we, we imagine, have made use of to fill up the tale of illustration) is a good deal better forgotten, and is certainly not worth serving up again in illustration of a furniture book for the present day.



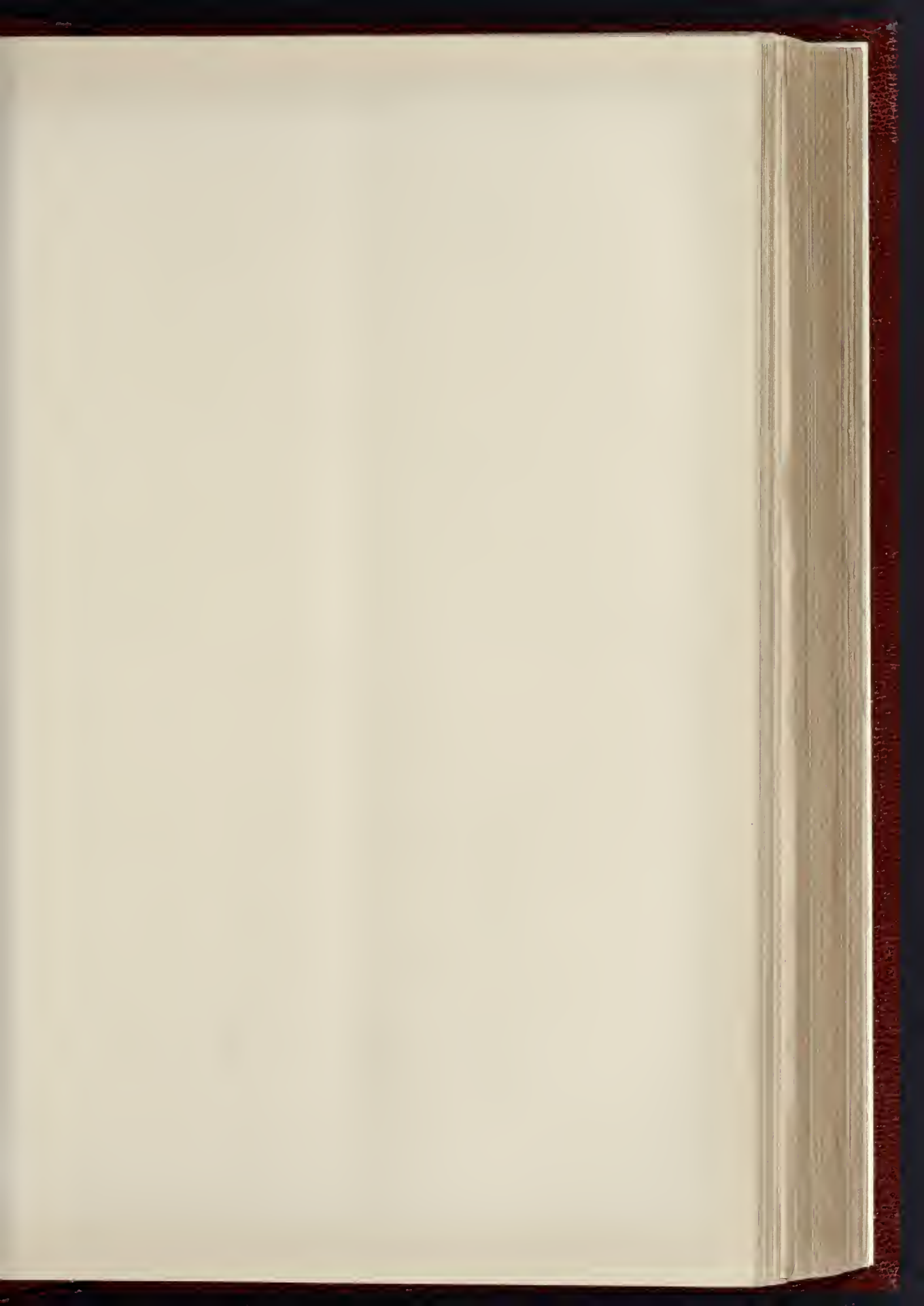


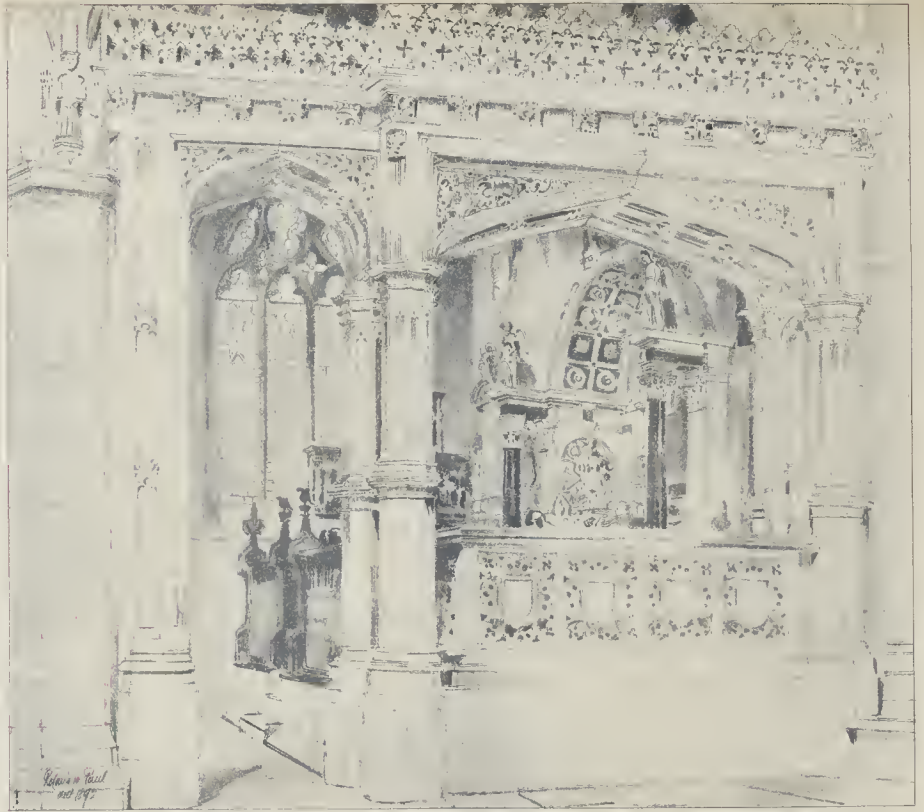
ILLUSTRATION OF PEDESTAL



G. D. LAHAN, SURVEYOR,
 11, WESTMINSTER SQUARE, LONDON, W.

DESIGN AND DETAILS OF PEDESTAL OF THE BURNS STATUE, AYR.—Messrs. MORRIS & HUNTER, ARCHITECTS

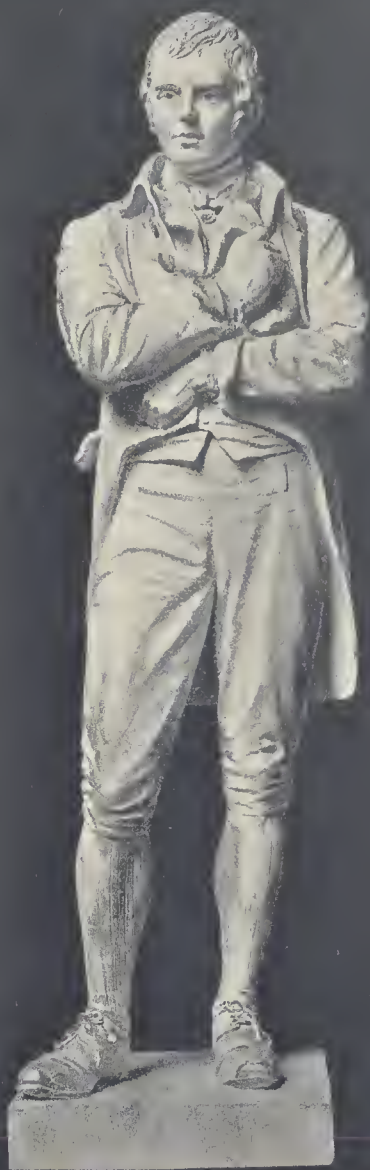




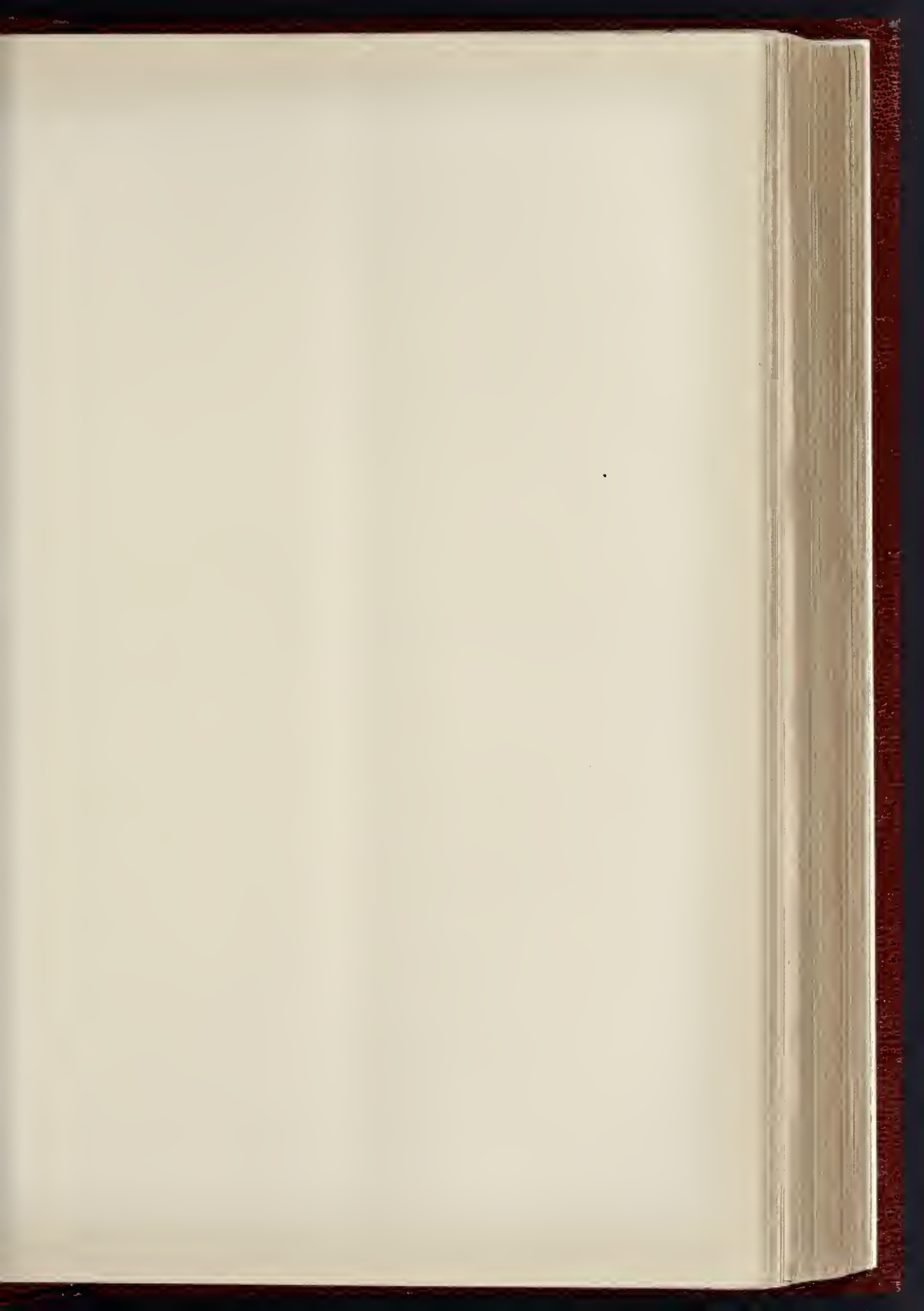
INK-PHOTO SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

STRATFORD-ON-AVON CHURCH, WARWICKSHIRE: THE CLOPTON CHAPEL.

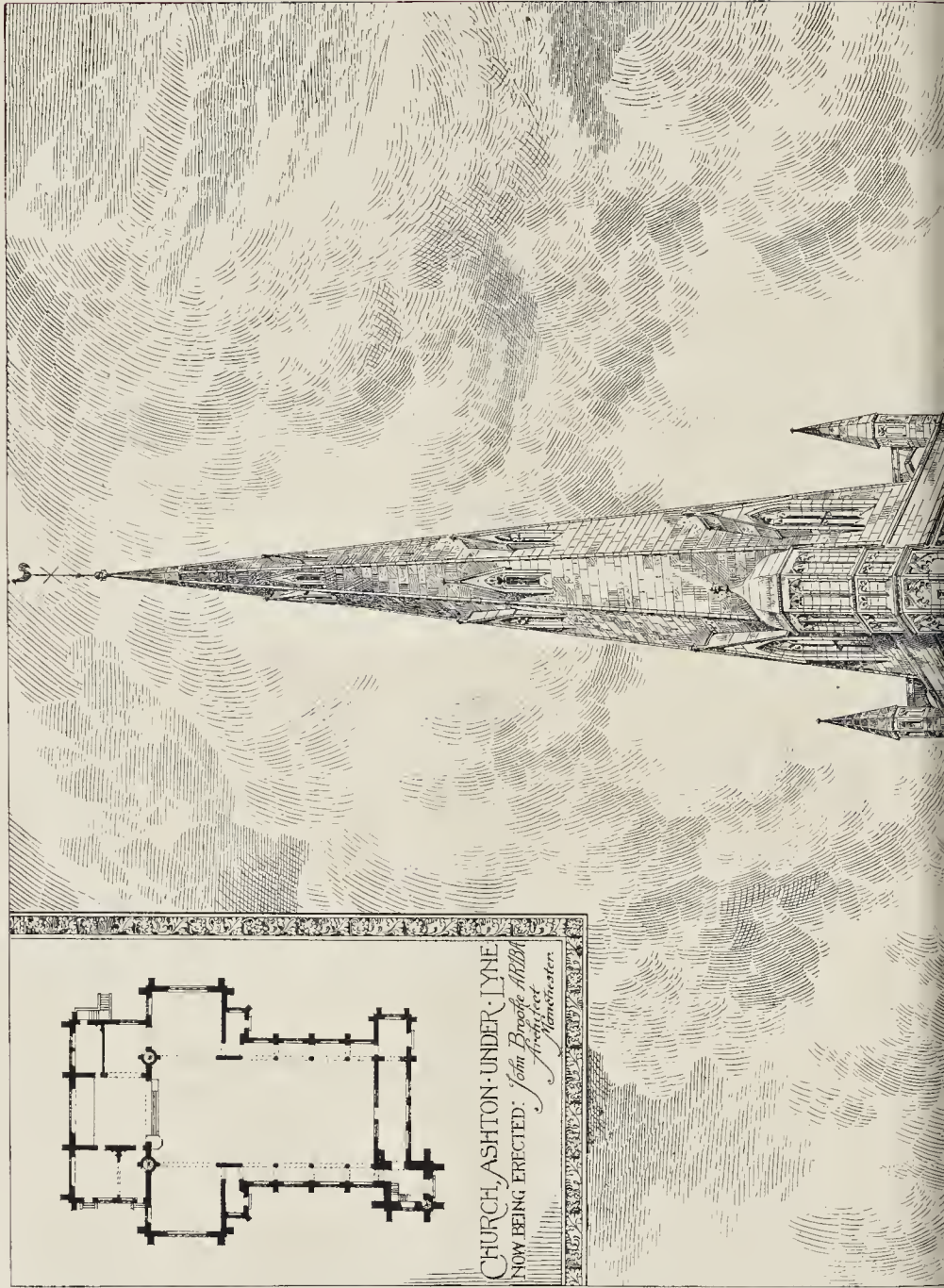
1. GENERAL VIEW OF CHAPEL FROM THE NAVE.
2. TOMB OF THE EARL AND COUNTESS OF TOTNESS.

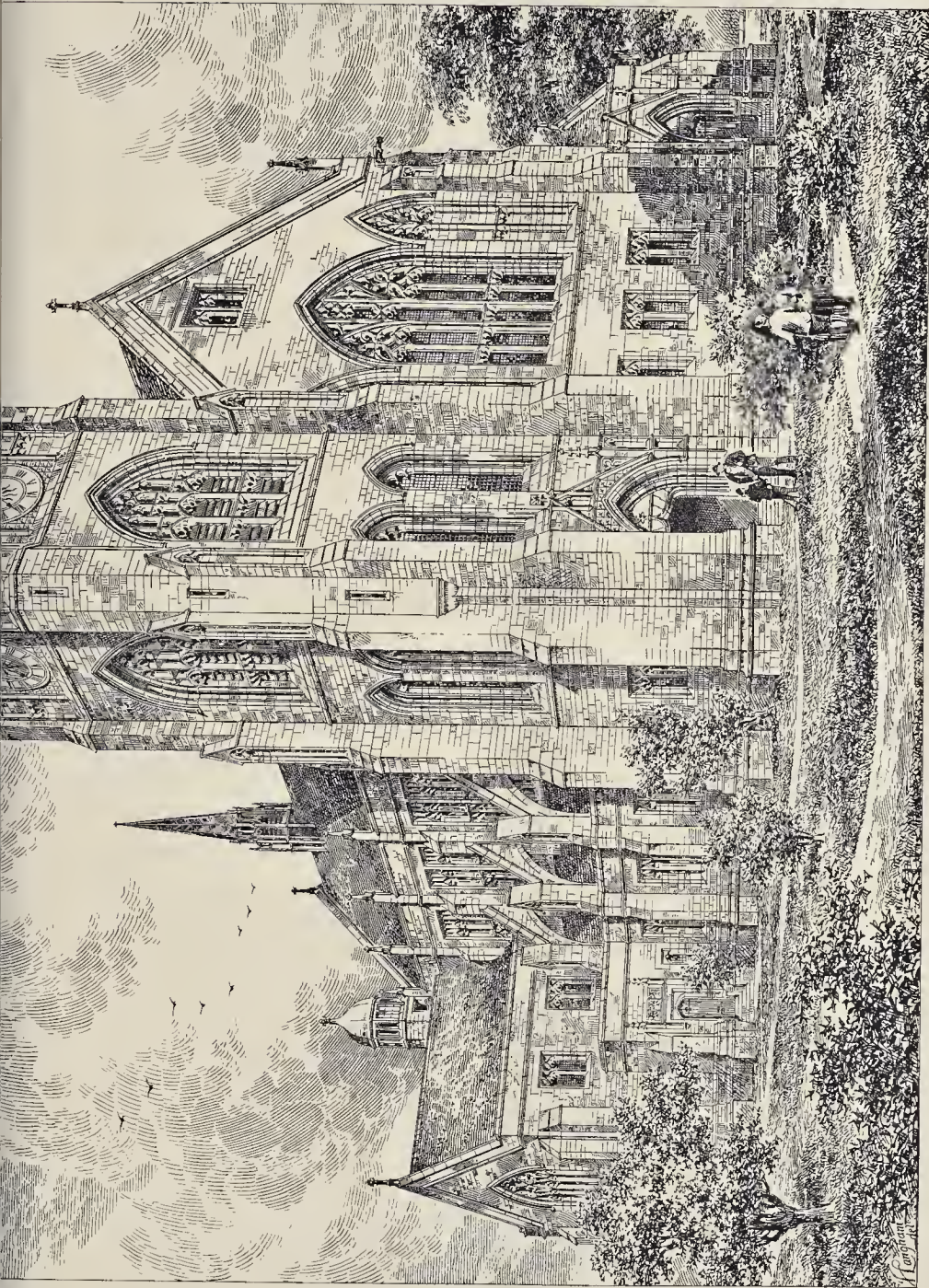


THE BURNS STATUE, AYR.—MR. G. A. LAWSON, SCULPTOR



THE BUILDER, SEPTEMBER 10, 1892.





PHOTOLITHO SPRUCE & CO. 483 EAST PRING STREET, PHILADELPHIA, PA., U.S.A.

Royal Academy Exhibition, 1892

In short, this is a creditable and handsome popular book, well got up and furnished with a large number of illustrations of more or less interest, and as a popular hook it may have its merits, though it can hardly be of much value to designers or to serious students of the subject.

The Public Health (London) Act, 1891. With Explanatory Notes, &c., by E. LEWIS THOMAS, M.A., LL.M., Barrister-at-Law. London: Knight & Co.

THIS is an exceedingly useful exposition of, and commentary on, the Public Health (London) Act of last year. It includes comparative tables of sections of repealed Acts and of existing enactments, a useful appendix containing the enactments applied, and the Orders and Model By-Laws of the Local Government Board; it has the additional merit of possessing a copious index. Many people are still unaware that last year there was accomplished for sanitary legislation in London what had been done sixteen years before for the remainder of the country, the Public Health (London) Act, 1891, is not only a codifying Act, but also an amending Act. "It is the result of the consolidation, by the Standing Committee on Law, of two Bills introduced into the House of Commons by Mr. Ritchie. The first Bill was a Bill to amend the law as it then was, the second Bill was to codify and consolidate the then existing enactments. The second Bill repealed and re-enacted more than thirty Acts, or portions of Acts, which applied to London, and which were variously known as the Nuisances Removal Acts, the Sanitary Acts, the Metropolitan Management Acts, the Police Acts, Smoke Acts, Michael Angelo Taylor's Act, &c." The changes and improvements which have been effected are succinctly and lucidly pointed out by the author, and their hearings explained. Although the explanatory notes seem sufficiently full and complete, the book is nevertheless compendious in form, and is one which should be in the hands of every one engaged in metropolitan local government. Even the "intelligent ratepayer" would be all the better informed as a critic of local government matters if he would master this book.

The Public Health (London) Act, 1891, a Handbook for the Use of House-Property Owners. By WM. HARNETT BLANCH. London: P. S. King & Son.

THIS, to the special class to whom it appeals, will be found to be a very useful publication, containing as it does notes, index, and an explanatory chapter. While there are no doubt instances in which, by the operation of the law, hardships are entailed upon house-property owners, the book seems to be published so exclusively in the interests of a class who have hitherto known how to look after themselves pretty well. The author appears to be the Secretary of "The London Freeholders' and Leaseholders' Defence Association," one of whose objects seems to be to help its members to do as little as possible in the way of sanitary work or anything else that will involve expenditure. No doubt, as the Association say in a kind of manifesto, "recent legislation has seriously affected the interests of the owners of house-property." And in the main very rightly so too, so far as sanitary legislation is concerned, as all who know London and are disinterested in the question will agree. Still, it is as well to have on record the views of the property-owners.

The Year Book of the Imperial Institute of the United Kingdom, the Colonies, and India. Compiled chiefly from Official Sources. London: Published by the Imperial Institute.

THIS is the first issue of a very useful and instructive statistical record of the resources and trade of the Colonial and Indian possessions of the British Empire. It is published under the authority of the Executive Council of the Imperial Institute, and is likely to prove a reference hook of permanent value.

A Concise Dictionary of the English Language. By CHARLES ANNANDALE, M.A., LL.D. New and Enlarged Edition. London: Blackie & Son, Ltd. 1892.

THIS excellent work is based on Ogilvie's "Imperial Dictionary," and though it consists of

nearly 850 closely-printed pages, the paper and typography are such that the book is not at all unwieldy. It is well printed and arranged, gives the etymology and pronunciation of words, and contains what appears to be a tolerably full vocabulary, literary, scientific, and technical, with colloquialisms and phrases, notes on synonyms, pronouncing lists of proper names, foreign words and phrases, abbreviations, &c. We say a "tolerably full" vocabulary, although in regard to technical words we miss "hatter," the slope or inclination of a retaining wall, and "ramp," of a staircase,—to name only two examples. But, notwithstanding some omissions, the dictionary contains a large number of technical words not to be found outside the covers of technical dictionaries and encyclopedias. A useful feature is the alphabetical list of English writers, with dates of their birth and death, but this is not quite complete. For instance, while the name of James Ferguson is given as a writer on architecture, the name of J. H. Parker is absent. But no doubt the compiler of such a list has a difficult task in keeping it within reasonable limits of space. On the whole, we can cordially recommend the "Concise Dictionary of the English Language" as the best recent work of the kind which has come before us.

Spon's Engineers' and Contractors' Illustrated Book of Prices of Machines, Tools, Ironwork, and Contractors' Material. 1892-3. London: E. & F. N. Spon.

THIS is a very useful collection of excerpts from engineering catalogues, and is likely to be of considerable assistance in estimating, the prices of the articles illustrated and described being in most cases given. It seems to be a not unsuccessful attempt to bring together for one group of trades the most salient features of the catalogues of many leading firms. The book is well printed and got up, and has a good index.

"Reid's Patent Indexed Ready-Reckoner" (Newcastle-on-Tyne: Andrew Reid, Sons, & Co.) is now in its third edition. It readily shows the value of from 1 to 50,000 articles at any given rate, from one-sixteenth of a penny to £1. We have had occasion to use it several times since it has been on our desk, and we find it to be very speedy and handy, and absolutely accurate, as a ready-reckoner of course should be.—Those who have not yet had their holidays, and who are contemplating trips on the Continent, may most profitably invest sixpence in the purchase of one or other of the following convenient and well-printed and illustrated handbooks, viz.—(1) "The Tourist Guide to the Continent," edited by Percy Lindley, and published, by the authority of the Great Eastern Railway Company, at 30, Fleet-street, and at the Continental Department, Liverpool-street Station; (2) "Walks in Holland,"—the term "walks" being elastically interpreted to include cycling, boating, railway, and coaching trips as well as journeys on foot; (3) "Walks in the Ardennes," with boating, fishing, cycling, and shooting notes; and (4) "Holidays in North Germany and Scandinavia." The three last-named are all edited by Percy Lindley and published at 30, Fleet-street. They are all very nicely got up and full of useful information to the intending tourist, and the illustrations, although necessarily small, are well-drawn and engraved, and likely to attract sketchers and other travellers in search of the picturesque (if not this autumn, owing to the presence of cholera in Hamburg, at any rate on the first available opportunity).

TRADE CATALOGUES.

Messrs. Merryweather & Sons have sent us their Catalogue (Section D) of Pumps and Water-Supply Apparatus. It is illustrated and priced, and includes many articles worthy the attention of municipal and sanitary engineers. From the same firm we have received an explanatory illustrated pamphlet on their method of supplying water to mansions, villages, institutions, farms, &c. It is well worth attention, and shows how country houses in isolated positions may be supplied with a view both to hygiene and protection against fire.

From Messrs. J. Tylor & Sons (Ltd.) we have received their new Catalogue (Part I.) of Sanitary Appliances, Pumping Apparatus, and General Fittings. It contains illustrations and descriptions of a great many excellent ap-

pliances, and a mass of useful information not often found in a catalogue. One of this firm's specialities is their flushing-rim lavatory basin, which embodies a very desirable and necessary improvement. It is not quite new, for we saw it some four years or more ago, and spoke approvingly of it; we are surprised that it has not altogether superseded the old form of basin. We cannot express our approval of the dark empty space, not easily to be got at, which seems to exist for the collection of dust beneath the "Column" Pedestal Closet (page 19 of Catalogue). With regard to this same closet (which has a very good form of basin) the lead trap is joined to the earthenware basin by a brass collar, and it is claimed that this is a better and safer method than the connexion between an earthenware trap and a leaden soil-pipe; but there is here also a joint between earthenware and metal, which is, however, on the inner or house side of the trap, though scarcely "above the trap," as is claimed. We are not satisfied that this is a wholly satisfactory solution of the difficulty, though it is certainly better and safer than a joint between an earthenware trap and a leaden soil-pipe on the out-go side of the trap. With regard to the "Pedestal" Valve Closet, figured on p. 12 of the catalogue, it is said that "it does not require a small supply cistern." Why not? And how is it supplied? The catalogue is admirably got up, and will be found exceedingly useful when specifying.

Messrs. Steel & Garland recently sent us one of their new Catalogues (Book 5) of stoves, grates, mantel registers, and over-mantels, ranges, warm-air stoves, curns, fenders, rests, &c. It is well printed and illustrated, and we would call especial attention to the "Marlborough" Grate (Garland's patent), which appears to possess many advantages,—of which, if we mistake not, we have before spoken. It has an adjustable canopy, acting as a register door; an overhanging fire-brick back, with Teale's economiser; and steel vertical bars. It is claimed for it that it ensures great heating power combined with economy in fuel, the rate of combustion being under control.

Messrs. Hayward Tyler & Co. have sent us their "List A" of "Plumbers', Waterworks', and Fire Fittings," a very complete and useful priced and illustrated list of water and sanitary fittings of all kinds. But why, we ask you more, will firms of repute continue to manufacture, and to illustrate and price in their catalogues, that long-condemned abomination the "pau-closet," with its filthy "container"? We shall no doubt be told again, as we have been told before, that "there is a demand for them." If so, "the more's the pity" that reputable firms should vitiate their catalogues by the inclusion of such things.

Messrs. Thomas Crapper & Co. have also sent us their new Catalogue of Sanitary Appliances, illustrated and priced. It is a very useful hook, and gives particulars of some very good things, including the "Improved Keon Trap" and some excellent valve and other closets, water-waste preventers, baths and bath-fittings, &c. Of most of these we have spoken in terms of commendation on former occasions.

Messrs. Adams & Co. send us their new Catalogue of patent sanitary specialties, including automatic-flushing latrines for schools and institutions. These latrines are admirably adapted for their purpose, and elicited the warm approval of a French specialist in school sanitation who attended last year's International Congress of Hygiene. Lavatories, urinals, closets, flushing-tanks, gullies, &c., are among the many other items of the catalogue, which is in two sections, one of which is devoted to ironwork.

Mr. A. M. Fowler, jun., A.M.Inst.C.E., sends us a small illustrated catalogue of his "self-acting water-closets," flushed with sloop-water. These may, of course, be advantageously used in situations where water for flushing purposes is scarce, but they are far from being the ideal form of water-closet. The same remark applies even more to the latrines flushed in the same manner. In "Arrangements C & D" there are, in lieu of closet-pans, vertical drain-pipe shafts some 3 ft. or 4 ft. deep, which can never be flushed, the flush being entirely confined to the horizontal pipe below these shafts.

LECTURES ON SANITARY SCIENCE.—Mr. Allan Greenwell, Surveyor and Inspector to the Frome Rural Sanitary Authority, has been appointed by the Technical Education Committee for the Frome District to deliver a course of lectures on "Sanitary Science."

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ARCHITECTURE.

SIR.—I am glad Mr. Belcher has drawn attention to the relations of the Institute to architects, and architecture as a fine art. The policy being pursued by the R.I.B.A. has brought about the critical state of things he has the courage to recognise; on its decision regarding the qualification of Fellows—now under consideration—depends its existence as an Institute of "Architects." Many of us deplore that the question has ever been raised, but as it is, the time has come to look it fairly and squarely in the face, and the question of questions is simply this, "Is the R.I.B.A. to remain an Institute of 'Architects,' or what?" It has now as Mr. Belcher says, "an opportunity to put itself right with regard to such matters," and everyone who has the interests not only of the Institute but of architecture at heart, must fervently hope the opportunity will not be thrown away.

The Institute is called upon to legislate on the qualification for Fellowship,—for whom? Not those inside its ranks, but those who are outside, and it is notorious that many of our leading architects are among the latter; and not only so, but it has lost within the last year or eighteen months several clever young men, who, in all probability, will be the leaders in the future, hence it becomes of the first importance to ascertain not so much what the insiders may consider applicable to those outside but what the outsiders themselves desire, and what is wrong with the constitution or the policy of the Institute itself, which keeps and drives such men from its ranks. If it is to be an Institute of *Architects* in the future, the anomaly of many men who are influencing the architectural thought and progress of the day standing aloof from its councils must cease; and surely one very obvious course is to invite those very men for whom it is proposed to legislate to favour us with the benefit of their views, if peradventure some way may be found to meet them. Another obvious course is to insist that, whatever may have been done in the past, all future Fellows must first and foremost be architects in the strict sense of the word. Mr. Belcher has told us truly that an architect must be an artist, or he has no right to the title. It is, therefore, only by the "quality" of his work he can have any claim to the distinction of "Fellow," for if it be not a distinction, why have two classes, and what inducement is there for a man to go up from the one to the other? Still another obvious course is to require that every candidate shall be the designer of his own work,—in other words, an architect in fact as well as in name. If no amount of examination can make a man an architect, then surely no test is needed beyond the quality and the personality of his work. By it alone he is an architect, or he is not, and, therefore, worthy of a Fellowship or the reverse.

Just how all this may be best accomplished is what is now under consideration, and it is for the Institute to find a satisfactory solution of the problem. J. M. BRYDON.
5, Cambridge-place, Regent's Park, N.W.,
September 5, 1892.

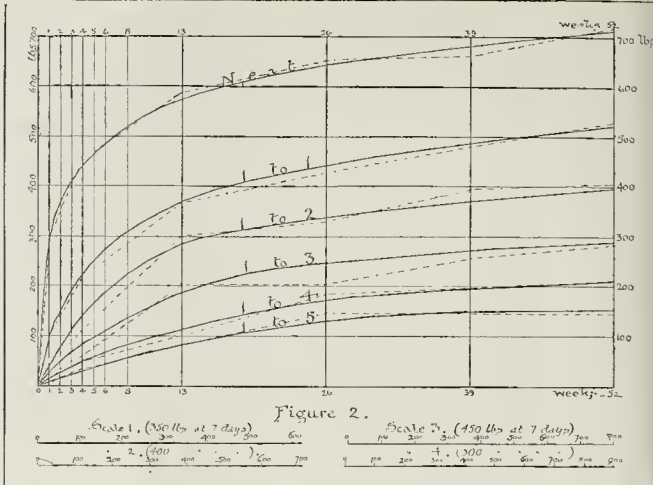
DILAPIDATIONS.

SIR,—I have not observed in the *Builder* any notice of the case of Tichborne v. Weir, which was recently decided by the Court of Appeal; a report appears in the *City Press* of August 31.

This case is of much importance to both lessors and lessees, as it opens quite a new question, and I therefore think it desirable to draw attention to it.

It was held that as the defendant Weir held an assignment from one Giraud, who held the lease as mortgagee, Giraud could only transfer his own equitable interest in the lease and any right accruing to him through long possession; he had not acquired the lease itself, therefore he could not assign it to the defendant; and as the defendant had not taken the lessee's estate under the lease, he was not bound by the covenants of the lease, and the payment of rent did not make him liable to them. The performance of the covenants can only be enforced against a tenant when it can be proved that he is the assignee of the lease, or is prevented by his own act from denying the assignment. The decision of the court below in favour of defendant was therefore upheld.

The result of this judgment seems to be that when any mortgagee forecloses neither he nor any



of his assignees are in any way liable under the covenants of the lease; and, as the result, at the expiration of the lease, unless the lessor can get at the defaulting mortgagor or his heirs, executors, administrators, or assigns (a most unlikely possibility), he must put the premises in repair himself and at his own cost; and, as very many leasehold properties contain an assignment from a mortgagee somewhere in the title, the decision must be very far-reaching, and totally alter the position of lessor and lessee in many dilapidation cases.

BERNARD DICKESE.

September 5, 1892.

WIGGENHALL, ST. MARY.

SIR,—Some months ago you were so good as to insert a letter of mine on the destruction of ancient roof screens. I mentioned a rumour that the famous Caroline screen, dated 1625, had been removed from the church of Wiggenhall, St. Mary the Virgin, so noted for its woodwork and sixteenth-century brass lectern. I regret to say that a recent visit shows even greater damage; for not only is the screen gone, but with it the lay impropriator has carried off the stalls as well. Nothing remains in the chancel of the old work but the lower painted panels of the Medieval screen, which stood just east of the more recent one. These the present Vicar found knocking about and has set up against the east wall. So far as I could learn, no faculty was obtained for these destructive works; in which case I imagine the impropriator can be compelled to reinstate them. The new chancel fittings and reredos seem to show an architect's hand. It would be interesting to know his name.

In the neighbouring church of Tilney, All Saints, I found the fine screen (1618) still *in situ*; but a double Norman piscina has been either destroyed or blocked,—quite recently,—and the sanctuary levels are so altered that not one of the fine Decorated sedilia can now be used. VIATOR.

THOMSON'S PATENT BALL-VALVES.

SIR,—I shall be obliged if one of your readers can inform me of the name and address of the present maker of Thomson's patent ball-valves, sold in 1882 by a Mr. Varias. H. H.

The Student's Column.

CONCRETE XI.

ARTIFICIAL CEMENTS (continued).

PORTLAND: ADHESION.

CEMENTS have not been as frequently tested for adhesion as for tensile strength. A somewhat elaborate series of experiments with American cements and bricks is tabulated in Gilmore's "Limes, Hydraulic Cements, and Mortars," and General Sir C. W. Pasley in England, about fifty years ago, made similar experiments by tearing apart bricks and various building-stones which had been united by an artificial cement. As far as the adhesive strength of cement is concerned, these latter experiments are quite out of date. A circular issued some years ago by the Selentic Cement Company shows that a force of 23 lbs. per square inch is required to tear apart common stock-bricks after they have

been united for twenty-eight days by a mortar consisting of one part Portland cement to four parts sand. Mr. Grant found that bricks cemented together with mortar composed of one part cement to two parts sand, required, at the end of twenty-eight days, a force varying from 15 lbs. to 30 lbs. per square inch to tear them apart.

The most extensive series of experiments on the adhesive strength of Portland cement was carried out by Mr. Mann. The tests were made by tearing apart small pieces of sawn, close-grained limestone, which had been joined together with cement. His experiments showed that the adhesive strength did not bear a uniform relation to the tensile or cohesive strength, but varied from about 1 to 5 to 1 to 9 in the seven days' tests, and from 1 to 3 to 1 to 5 in the twenty-eight days' tests. The adhesive strength, it will be seen, increased more rapidly than the cohesive, in the twenty-one days which elapsed between the two tests. He also proved that the finer a cement is ground the greater is its adhesive strength. The average adhesive strength of neat Portland cement, as tested by Mr. Mann, may be considered to be between 80 lbs. and 90 lbs. per square inch, at twenty-eight days; the tests being carried out with cement bedded between pieces of sawn, close-grained limestone.

The adhesion varies not only with the quality of the cement, but also with the quality as well as quantity of the sand, the porosity of the substances joined together, their degree of saturation, and, of course, the length of time during which they have been joined. The thorough saturation with water of the materials to be united, and the fineness of the cement, are important if high results are to be obtained.

Increase of Strength, and Durability.—We have now considered the tensile, compressive, and adhesive strength of Portland cement at early dates, and have seen the remarkable degree of strength which it attains in these limited periods. The accompanying diagram (Fig. 2) shows graphically the tensile strength, to the age of one year, of Portland cement mixed with different proportions of clean pit-sand. The dotted line represents the actual breaking strength at the various dates, and the full line shows the probable mean curve of strength. The figure is based on experiments made by Mr. Grant, in 1862-3,* on briquettes of the shape marked A in Fig. 1 (see the *Builder* for August 27); as we have stated, such briquettes give considerably lower results than are obtained with the briquettes of better shape which are now used. For this reason, 50 per cent. has, in each case, been added to the strengths obtained by Mr. Grant. The chief lesson to be learnt from Mr. Grant's tests is the difference in the rate of hardening of different mortars; for instance, neat cement would support 300 lbs. at one week; 1 to 1 mortar would do the same at 7 weeks; 1 to 2 at 15 weeks; and 1 to 3 not until after a year. When we are told

* "Proceedings of the Institution of Civil Engineers," vol. xxv. (1865-6).

that the supports of ordinary concrete floors may be struck in one week after the floors have been laid, we have only to refer to this figure to be convinced of the danger of following such advice. A period of from four to six weeks ought always to elapse before any stress is put on such floors, either by removing the supports or by traffic. It must not be considered that all cements increase in strength in the degree shown in the figure, or that the ratio between the neat cement and the mortars is always the same; the figure must be taken as approximate only. The tensile strength of the neat cement at seven days is only 300 lbs. per square inch, even after allowance has been made for the imperfect form of the briquettes used in testing; nowadays, a strength of 450 lbs. to 500 lbs. is common. The strength at different ages of mortars made from cements of various initial strengths, may be roughly estimated by using a different scale for measuring the curve of strength from the base line; thus, Scale 1 (see fig. 2) may be used for cements with a strength of 350 lbs. at seven days, Scale 2 for 400, Scale 3 for 450, and Scale 4 for 500.

The further question remains,—Is its strength permanent? Mr. Grant says that the process of hardening goes on for years, and "there is no reason to fear that good cement ever deteriorates." His opinion is based on the result of a series of experiments extending over ten years (1858 to 1868); the tests during the last three years gave slightly lower results, but this he considers to have been due to the fact that the briquettes had been neglected and moved from place to place owing to the death of the person who had had charge of them. We need not say that Mr. Grant's opinion on any matter concerning Portland cement carries great weight.

Mr. A. E. Carey, in a paper read in November, 1891, before the Institution of Civil Engineers, said:—"The molecular structure of Portland cement changes with age, its hardness and brittleness increasing, and its elasticity diminishing. There is a point, therefore, at which the cement begins to show a falling off in tensile strength, while the compression tests continue to improve. The gauging of cement with seawater (instead of fresh) allows this result to be attained more speedily with the same cement."

Professor Unwin states that "for ordinary tension briquettes the gain of strength is nearly proportional to the cube root of the time of hardening, and that both for a neat cement and cement mortar." In other words, if the strength at seven days be taken as 1, the strength at twenty-eight days will be 1.6, and at six weeks 2; this shows the wisdom of allowing the centres of concrete arches and floors to remain in position as long as possible.

Water.—The quantity of water used in making briquettes has a great influence on the results of the tests. Too much water is injurious, and it is therefore customary to use no more than is necessary to bind the cement,—say, 18 or 20 per cent. by weight. This is a matter which must, to some extent, be left to the judgment of the person making the test, but it may be interesting to give the quantity of water used in Germany for different mixtures of cement and sand, the proportions being all obtained by weight:—

TABLE XV.

Quantity of Water Required in Briquettes.

Cement.	Sand.	Water.
Neat cement	100	27.6*
1 cement to 1 sand.	50	60
1 " " 3 " "	25	75
1 " " 4 " "	20	80
1 " " 5 " "	16.6	83.3

* Add that the water used with the cement ought to be pure, free from earthy and organic matter, &c.

Time of Setting.—The time of setting of different Portland cements varies from a few minutes (say, ten) to as many hours. If a pat of neat cement is indented by a moderate pressure of the thumb-nail at the end of two hours, it may be considered slow-setting. It is customary now to notice the time of "initial set," that is, the commencement of the stiffening process, and the "set hard," which is the time when the cement will bear without indentation a moderate pressure of the thumb-nail. The former is valuable, as it enables us to form an idea of the limit of time within which the cement ought to be deposited in work after being gauged. It is determined by gauging a sample of cement and observing one or more pats kept in air. If greater accuracy be re-

quired, the time of setting can be ascertained by the needle test, but the thumb-nail test is usually sufficient.

As a rule, a highly-burnt cement sets more slowly than one lightly burnt, but there are exceptions, and more frequently the rate of setting depends rather on the composition of the cement than on the burning. An excess of clay increases the rapidity of the setting, as we have seen in the case of Roman and similar cements; excess of lime has the opposite effect. It is generally held that the best slow-setting cements are eventually stronger than the best quick-setting. The time of setting is delayed by storing and thoroughly air-slaking the cement, and the same effect can be produced by adding sulphuric acid or gypsum (sulphate of lime) to the cement on gauging. In either case, the maximum strength of the cement is more rapidly attained. Experiments made by Mr. Grant in 1877 showed that cement spread in air for seventeen hours took five or ten minutes longer to set, and bore at seven days 5 per cent. more tensile stress than the same cement gauged as soon as it was taken from the sacks. Experiments by Messrs. Dyckerhoff confirm this, and show further that the addition of 1 per cent. of gypsum to a cement, which set in twenty minutes, delayed the setting to 600 minutes, and 2 per cent. delayed it to 840 minutes, and in both cases the strength of the cement, whether tested neat or with sand, was considerably increased; the increase of strength with 2 per cent. of gypsum was about 13 per cent. at the end of a year. It is now known that gypsum endangers the permanence of the strength of cement.

Storing the cement for some months altered the time of setting from twenty minutes to 630, and the stored cement mixed with three parts standard sand was 20 per cent. stronger at the end of a year than the original cement tested in the same way.

The advantages possessed by slow-setting cements in strength, convenience of manipulation, &c., are of great value, and such cements are almost always preferable to quick-setting ones.

Soundness.—The fineness, tensile strength, and soundness are three of the most important particulars to be ascertained respecting any Portland cement. The fineness of a cement is an indication, other things being equal, of its sand-carrying properties,—the finer the cement the more sand will it take. A finely-ground cement is also less likely to be unsound than a coarse cement. The importance of a high tensile strength is patent to every one. But if a cement be finely-ground and of great strength, and withal have not soundness, it ought not to be used. An unsound cement may attain great strength at first; concrete made with it may harden properly, and seem for weeks, and even months, to be thoroughly hard and sound, but gradually a change is apparent, the concrete begins to disintegrate, and after a time becomes an almost incoherent mass of rubbish. Then, as the author has known, the architect must perforce order the work to be done over again, and time and money are lost. But sometimes the defect is not observed before the final certificate is granted; perhaps the foundations are covered before the unsoundness is apparent, or the floors have their upper and lower surfaces finished, and so on, but sooner or later the failure is visible. In one case, 18-in. brick walls were thrust out of perpendicular by the expansion of concrete floors made with unsound cement.

A test for soundness can be carried out without much difficulty, but as some cements take such a long time before their unsoundness develops to any dangerous extent, an artificial means of accelerating the hardening process has been desired. Some persons have advocated, but not very wisely, the making of thin pats of cement-paste on an iron plate and beating them on a gas-jet or in front of a fire. The best apparatus which has yet been devised is that described by Mr. Faija in his book on Portland cement. An illustration and description of this apparatus were given in the *Builder* for November 22, 1890. The fact that moist heat accelerates the hardening of cement is the leading idea in Mr. Faija's test, and this is turned to account by placing the cement pats on a slip of glass within a closed vessel, containing water under the glass; this water is kept at a fairly uniform temperature of about 112 deg. to 117 deg. Fahr. After remaining three hours in the damp atmosphere of this vessel the pats are put into the hot water and

allowed to remain there for twelve or fifteen hours, when they are taken out and examined for cracks, lifting from the glass, warping, &c. If these are visible, the cement must be accepted with caution, or, in bad cases, condemned altogether.

It is, however, possible for anyone to carry out a test which will be of some aid in ascertaining the soundness of a cement, although it is not of equal value to the test already described. Take samples of the cement from three or four bags or barrels, immediately on their arrival at the building-site, and mix the different samples together dry. Then make, on two pieces of glass, two pats of neat cement, say, 2 in. or 3 in. in diameter, and about 1/2 in. thick at the centre, but thin at the edges. The time of setting may be ascertained during the progress of this test. When the pats are set hard, place one in water and examine it daily. If the cement have any tendency to "blow,"—i.e., if it be unsound,—very fine cracks will appear at the edges, and the edges may leave the glass. The other pat, kept in air, ought when hard to have a greyish-white hue; a buff colour indicates an "over-clayed" cement, and such cements are weaker than cements of proper composition, and are, as has already been stated, liable to crumble away on exposure to the atmosphere. Another cause of disintegration is the presence of free quicklime in the cement; the danger arising from this can be minimised by properly air-slaking the cement before using it, but an over-clayed cement cannot be improved,—it ought to be rejected. Similar pats made of cement and sand (1 to 3) may be made and tested as above with advantage.

Air-slaking.—Some persons consider that ordinarily good Portland cement does not contain more than 1 per cent. of free lime, but as no method of accurately ascertaining this exists, the figure is, perhaps, more or less guess-work. Judging from the increase of bulk, which ensues from thorough air-slaking, we are inclined to believe that cement of that description contains in many cases 3 or 4 per cent. of free lime, and some cements probably contain considerably more than this. When we remember that calcium oxide is converted by slaking into calcium hydrate, a substance two or three times its bulk, we cannot fail to see that the development of this slaking action in a cement-paste which has already begun to set, must be injurious and must at the very least lessen its ultimate strength, while in extreme cases it may prove disastrous.

GENERAL BUILDING NEWS.

VILLA RESIDENCES, BIRMINGHAM.—Building operations have been commenced for the erection of forty villa residences, situated on the "Rotton Park Estate." Twenty of these houses will front to Gillott-road, the remaining twenty will front to Summerfield-crescent; the total length of frontage extending 900 ft. Each of these residences will contain drawing and sitting rooms, two parlours, kitchen, scullery, and usual outbuildings, five bedrooms, and bath-room, &c. The front elevation will be Gothic in style. The total cost of erection is estimated at about 15,000*l.* The contractor is Mr. Edward Airey, and the architect Mr. J. Statham Davis, both of Birmingham.

CONGREGATIONAL CHURCH, BIRKENHEAD.—The foundation-stone of a new Congregational church was laid on the 3rd inst. The building will have accommodation for 350 persons, and the work is being carried out by Mr. S. E. Dean, at a cost of 2,000*l.*, from the design and under the superintendence of Mr. Thomas W. Cubbon, architect, of Birkenhead.

NEW CATHOLIC CHURCH AT TENBY.—On the 10th ult. the foundation-stone of a new Catholic Church at Tenby was laid. According to the *Tablet*, the church is being built on ground purchased from the Corporation of Tenby for a sum of 350*l.*, and which formed a portion of Potter's Field recently acquired by that body for street improvements. The site is to the south-east of the south-west gateway. The principal dimensions of the church will be:—Chancel, 20 ft. by 16 ft. 6 in.; sanctuary, 15 ft. 6 in. by 12 ft. 4 in.; nave, 83 ft. by 30 ft. On the south side will be a side chapel and confessional, the nave being lighted on that side by four two-light windows. The east end will abut on the road, the sanctuary being lighted by two single light windows. It will have an elevation externally of 47 ft. The east front will contain two traceried windows with a niche between to contain a statue of St. Tello. On the south side of the nave will be an arcade, preparatory to the extension of the building by an aisle. In the recesses will be temporary windows for the purposes of light on that side of the church. In the west end there will be a

four-light window over a spacious gallery, the latter being approached through a turret stair. The following are the contractors for the work:—Mason and joiner work, Messrs. Guthrie & Co.; plaster work, William Gordon; plumber work, James Rasseid; plaster work, James Dairon & Sons; glazier work, Wm. Meikle & Sons; iron work, Jas. McMillan; and painter work, McCulloch & Co.

PRIMITIVE METHODIST CHURCH, TRIMDON GRANGE, DURHAM.—On the 3rd inst. a Primitive Methodist church was opened at Trimdon Grange. The building is of red brick, with stone facings, and of Gothic style. The plans are from the designs of Mr. J. F. Longstaff, Trimdon Grange, under whose superintendence the building has been erected. The builder was Mr. Burn, of Hartlepool.

INTERMEDIATE SCHOOL, MERTHYR TYDFIL.—The design for an intermediate school submitted by Mr. James Crombie, A.R.I.B.A., London, has just been accepted, and he has been appointed to carry out the work. The school will accommodate 100 boys and eighty girls, and will have besides the usual school and class-rooms, a gymnasium, workshop, laboratory, art, and cookery class-rooms, and a residence for the caretaker.

NEW STATION HOTEL, NEWCASTLE.—The new hotel attached to the Central Railway Station, Newcastle, is, says the *Newcastle Chronicle*, now virtually complete. The hotel stands facing Neville-street, at the east corner of the station. It has a frontage of 21½ ft., and the style is a free treatment of the Classic. The building was designed and carried out by Mr. William Bell, the N.E.R. Company's architect, the chief clerk of the works being Mr. Richard Story. Outside the stone portico of the hotel is a light iron carriage verandah. It is supported on iron columns, over which is a canopy filled in with cast metal work. The roof over is glazed. Passing through the entrance lobby to the hall, and ascending a short flight of steps, the higher level of the hall floor is reached, which is paved in mosaic work. The hall is 60 ft. long by 20 ft. wide, is on the same level as the ground-floor rooms, and is broken up by a staircase rising in easy flights to the floor levels above. The staircase is built in cement, with marble facings at each end where seen. Heating coils have been placed in the entrance to warm the air, which, in rising, draws out the vitiated air from the adjoining corridors to the roof, through which it is conducted by means of extractors. For the interior decoration faience work, produced at the Burnantoffs works, Leeds, has been largely used. In the main hall a lobby-screen, executed in walnut, has been placed. The height is divided into three panels, and separated by pilasters fluted, surmounted by moulded caps, supporting a curved frieze and enriched cornice with pediment over. The upper panels are glazed with tinted glass with floral designs in centre. There are three doors placed in the screen, but it is intended to use only the side doors. A roof curved to line with pediment and panelled on the under side completes the screen. On the left of the hall, facing the porter's box, there is a telephone office. Adjoining the telephone office is the luggage lift. There is also a large receiving room provided for luggage close by the lift. The passenger lift, which is situated on the opposite side of the hall, is operated from the offices by the corridor leading to the manager's room, &c. On the left of the entrance-hall is the corridor leading to the coffee-rooms, reading and writing room, dining-room, serving and still room, and ladies' lavatories, &c.; also to the billiard and smoke rooms. Outside the entrance hall the coffee-room is the ascending staircase, communicating with all the upper floors; and also the descending staircase, by which the billiard-room is approached. This is built in marble, and the side walls are treated in faience. At the foot of the staircase is the refreshment-bar. Lower down the corridor is the smoke-room, with lavatories and convenience for gentlemen opposite; then further on, at the end of the corridor, the entrance of billiard-room is reached. The arrangement of the rooms of the first floor is very similar to that of the ground floor, with the exception that the space over the coffee-room is divided into sitting-rooms of ordinary size. Most of the rooms on the first floor facing the street are to be used as sitting-rooms, and the back part set apart as bed-rooms. This floor is taken up with large drawing and dining rooms, lavatories for ladies and gentlemen, with bath-room, &c., and the staircase connecting each floor. The corridors leading to the rooms on all the floors are paved with mosaic. All the rooms, both on ground, first, second, and third floors, have been tiled up with the electric light and are fitted with gas-bells, which communicate with several outlets. In the basement of the building provision is made in separate larders for the reception of food and stores, large refrigerators being provided for perishable articles. From the kitchen the food is passed by means of lifts to the service rooms on various floors. The hot-water service is fitted with gas-lavatories, &c., throughout the building, is generated from one centre in the basement, consisting of two steam-heaters, with circulation-pipes carried from same throughout the building. The entrance-hall, corridors, and staircase, and the principal rooms on each third and first floors are heated by means of

low pressure steam radiators and air circulators, which, in the case of the principal rooms, are arranged with fresh-air inlets from the outside. The ventilation of the principal rooms, usually, and water-closets is provided for by means of fresh-air inlets taken off the floor-line, and foul air extraction tubes in the ceilings, carried to a main ventilation shaft in the centre of the building and rising above the roof, arranged with an extracting fan, and worked by means of a hydraulic motor, the waste water from which is used for automatically flushing the drains. For protection from fire there is a series of hydraulic mains passing through each floor, arranged with valves and hose pipes to cover all points. These mains are also used as service mains for general purposes, to ensure their always being charged, and are coupled to a large tank in the tower and to the company's main. The steam boilers are placed in a boiler house remote from the hotel, and the steam conveyed to same through a subway. The contractor for the whole building was Mr. Walter Scott, under whom the following sub-contractors have carried out the different classes of work:—Messrs. W. B. Wilkinson & Co., Newcastle, cement work; The Leeds Fireclay Co., faience work; Harman, Powell, & Co., Birmingham, balustrading; Benham Brothers, Leeds, ironing and hot water, &c.; Mr. J. H. Shouksmith, York, plumbing work; Messrs. Robertson & Sons, Newcastle, and Mr. Baguley, glazing; Messrs. Diespecker & Co., London, mosaic work; Messrs. G. Izant & Sons, London, electric bells; Mr. A. Stomens, London, electric light; Mr. J. F. Eber, Newcastle, ironing; Messrs. Embley & Son, Newcastle, marble work.

WESLEYAN SCHOOL BUILDINGS, CARDIFF.—The newly-erected Wesleyan Sunday Schools in Conway-road, Cardiff, were opened on the 24th ult. The building consists of a large assembly-hall at the rear, with ten class-rooms opening out from the ground floor and a similar number from the gallery, while the front portion consists of a suite of large rooms for use as a church-parlour and infants' and adults' class-rooms. The premises, which have been erected at a cost, including the freehold site, of about 3,500*l.*, were built by Mr. G. E. Griffiths from the designs of Messrs. Hahershon & Fawcner, architects, Cardiff.

BANK PREMISES, NEWPORT, MON.—New banking premises for the Newport branch of the National Provincial Bank have been erected at the corner of High-street and Tredegar-place. The building was designed by Mr. C. B. Goble, the architect of the banking company, and the contract for building has been carried out by Mr. John Linton, of Newport. The building rises from the pavement level with plinths of white Devonshire granite, which give place 5 ft. upwards, to Bath stone, of which both façades are built. There are five bays to High-street, and a similar number to Tredegar-place, between each bay being three-quarter engaged columns, with keystone heads over each of the windows. Underneath the balustrading is a sculptured floral frieze. All the floors are fireproof, the joists being of iron, filled with Portland cement and concrete, the flooring being of oak block and mosaic. The large banking-room is 42 ft. square, and is surrounded by pilasters of Devonshire marble, with bases of faience work and Ionic capitals. The dado is also of faience work, and the four iron columns which form the supports for the ceiling are enclosed in the same material. The floor is laid with mosaic and oak blocks inside the counters. The manager's room is opposite the main entrance. A lift communicates with the three strong rooms above. These are fire and burglar proof, being lined with white glazed bricks and having doors from Messrs. Chubb's factory.

PUBLIC HALLS, LENZIE.—The Lenzie Public Halls, the site of which is upon the east side of the public road leading from Lenzie to Kirkintilloch, Dumfriesshire, were opened on the 31st ult. The principal entrance to the hall is by a wide corridor leading to the entrance lobby, in which are placed the stairs leading to the lesser hall on the upper floor. On each side of the entrance corridor are placed the ladies' and gentlemen's cloak-rooms, with lavatories attached. Immediately over these apartments is the lesser hall, 40 ft. by 20 ft., lighted from front and ends by transomed and mullioned windows. To the rear of this, and on the ground floor, is the large hall, 60 ft. by 40 ft., with a small projecting gallery at the east end, and with raised platform at the west. This hall is finished with a coved ceiling in plaster work, and is lighted on both sides by tall, circular-headed windows, the lower part of the walls being finished in wood. It is seated for 600 persons. By taking advantage of the fall upon the ground, and by raising the floor of the hall a little above the roadway, accommodation has been found beneath the halls for billiard-room, reading-room, two waiting-rooms, kitchen, heating-chamber, &c., all lighted by side windows, and having the necessary lavatory accommodation. The waiting-rooms are connected with the hall by stairs at each end of the platform. The lighting, heating, ventilation, and sanitary arrangements have been carefully provided for. The front elevation is in the Scottish Baronial style, simply treated, with transomed and mullioned windows and cove-stepped gables. Mr. George Ferguson, builder, Glasgow, was the contractor for the whole of the work, and Mr. Tennant (of Messrs. Bauldie & Tennant, Glasgow) was architect.

FREE CHURCH, CARTNYNE, LANARKSHIRE.—The memorial-stone of Cartnyne Free Church, Shottleston, was laid on the 3rd inst. The site of the church is on the main road leading to Shottleston at the corner of Welshot-road. The style adopted is Gothic. The principal front of the church which is 54 ft. high, is pierced with two tracered windows, and has octagonal buttresses at each side. The windows to the side street have Gothic heads and double mullions in each. The entrance to the church is in the centre of the front gable, by a wide doorway communicating with a vestibule, from which two doors lead into the interior, and whence access is also gained to the gallery stair. The area of the church is seated for 450, and there is an end gallery containing 110 sittings. The church is so constructed that, when required, side galleries can be added to increase the accommodation. The arrangements of the interior admit of a ceiling 40 ft. in height to apex. A vestry, class-room, and small hall for prayer meetings will be erected behind the church. Mr.

Robt. A. Bryden, of Messrs. Clarke & Bell, architects, Glasgow, has prepared the plans, and the following are the contractors for the work:—Mason and joiner work, Messrs. Guthrie & Co.; plaster work, William Gordon; plumber work, James Rasseid; plaster work, James Dairon & Sons; glazier work, Wm. Meikle & Sons; iron work, Jas. McMillan; and painter work, McCulloch & Co.

PRIMITIVE METHODIST CHURCH, TRIMDON GRANGE, DURHAM.—On the 3rd inst. a Primitive Methodist church was opened at Trimdon Grange. The building is of red brick, with stone facings, and of Gothic style. The plans are from the designs of Mr. J. F. Longstaff, Trimdon Grange, under whose superintendence the building has been erected. The builder was Mr. Burn, of Hartlepool.

INTERMEDIATE SCHOOL, MERTHYR TYDFIL.—The design for an intermediate school submitted by Mr. James Crombie, A.R.I.B.A., London, has just been accepted, and he has been appointed to carry out the work. The school will accommodate 100 boys and eighty girls, and will have besides the usual school and class-rooms, a gymnasium, workshop, laboratory, art, and cookery class-rooms, and a residence for the caretaker.

NEW STATION HOTEL, NEWCASTLE.—The new hotel attached to the Central Railway Station, Newcastle, is, says the *Newcastle Chronicle*, now virtually complete. The hotel stands facing Neville-street, at the east corner of the station. It has a frontage of 21½ ft., and the style is a free treatment of the Classic. The building was designed and carried out by Mr. William Bell, the N.E.R. Company's architect, the chief clerk of the works being Mr. Richard Story. Outside the stone portico of the hotel is a light iron carriage verandah. It is supported on iron columns, over which is a canopy filled in with cast metal work. The roof over is glazed. Passing through the entrance lobby to the hall, and ascending a short flight of steps, the higher level of the hall floor is reached, which is paved in mosaic work. The hall is 60 ft. long by 20 ft. wide, is on the same level as the ground-floor rooms, and is broken up by a staircase rising in easy flights to the floor levels above. The staircase is built in cement, with marble facings at each end where seen. Heating coils have been placed in the entrance to warm the air, which, in rising, draws out the vitiated air from the adjoining corridors to the roof, through which it is conducted by means of extractors. For the interior decoration faience work, produced at the Burnantoffs works, Leeds, has been largely used. In the main hall a lobby-screen, executed in walnut, has been placed. The height is divided into three panels, and separated by pilasters fluted, surmounted by moulded caps, supporting a curved frieze and enriched cornice with pediment over. The upper panels are glazed with tinted glass with floral designs in centre. There are three doors placed in the screen, but it is intended to use only the side doors. A roof curved to line with pediment and panelled on the under side completes the screen. On the left of the hall, facing the porter's box, there is a telephone office. Adjoining the telephone office is the luggage lift. There is also a large receiving room provided for luggage close by the lift. The passenger lift, which is situated on the opposite side of the hall, is operated from the offices by the corridor leading to the manager's room, &c. On the left of the entrance-hall is the corridor leading to the coffee-rooms, reading and writing room, dining-room, serving and still room, and ladies' lavatories, &c.; also to the billiard and smoke rooms. Outside the entrance hall the coffee-room is the ascending staircase, communicating with all the upper floors; and also the descending staircase, by which the billiard-room is approached. This is built in marble, and the side walls are treated in faience. At the foot of the staircase is the refreshment-bar. Lower down the corridor is the smoke-room, with lavatories and convenience for gentlemen opposite; then further on, at the end of the corridor, the entrance of billiard-room is reached. The arrangement of the rooms of the first floor is very similar to that of the ground floor, with the exception that the space over the coffee-room is divided into sitting-rooms of ordinary size. Most of the rooms on the first floor facing the street are to be used as sitting-rooms, and the back part set apart as bed-rooms. This floor is taken up with large drawing and dining rooms, lavatories for ladies and gentlemen, with bath-room, &c., and the staircase connecting each floor. The corridors leading to the rooms on all the floors are paved with mosaic. All the rooms, both on ground, first, second, and third floors, have been tiled up with the electric light and are fitted with gas-bells, which communicate with several outlets. In the basement of the building provision is made in separate larders for the reception of food and stores, large refrigerators being provided for perishable articles. From the kitchen the food is passed by means of lifts to the service rooms on various floors. The hot-water service is fitted with gas-lavatories, &c., throughout the building, is generated from one centre in the basement, consisting of two steam-heaters, with circulation-pipes carried from same throughout the building. The entrance-hall, corridors, and staircase, and the principal rooms on each third and first floors are heated by means of

low pressure steam radiators and air circulators, which, in the case of the principal rooms, are arranged with fresh-air inlets from the outside. The ventilation of the principal rooms, usually, and water-closets is provided for by means of fresh-air inlets taken off the floor-line, and foul air extraction tubes in the ceilings, carried to a main ventilation shaft in the centre of the building and rising above the roof, arranged with an extracting fan, and worked by means of a hydraulic motor, the waste water from which is used for automatically flushing the drains. For protection from fire there is a series of hydraulic mains passing through each floor, arranged with valves and hose pipes to cover all points. These mains are also used as service mains for general purposes, to ensure their always being charged, and are coupled to a large tank in the tower and to the company's main. The steam boilers are placed in a boiler house remote from the hotel, and the steam conveyed to same through a subway. The contractor for the whole building was Mr. Walter Scott, under whom the following sub-contractors have carried out the different classes of work:—Messrs. W. B. Wilkinson & Co., Newcastle, cement work; The Leeds Fireclay Co., faience work; Harman, Powell, & Co., Birmingham, balustrading; Benham Brothers, Leeds, ironing and hot water, &c.; Mr. J. H. Shouksmith, York, plumbing work; Messrs. Robertson & Sons, Newcastle, and Mr. Baguley, glazing; Messrs. Diespecker & Co., London, mosaic work; Messrs. G. Izant & Sons, London, electric bells; Mr. A. Stomens, London, electric light; Mr. J. F. Eber, Newcastle, ironing; Messrs. Embley & Son, Newcastle, marble work.

SANITARY AND ENGINEERING NEWS.

MAREHAY SEWERAGE SCHEME.—For some years past (according to the *Ripley and Harlow News*) the Belper Rural Sanitary Authority have had under consideration the general insanitary condition of the hamlet of Marehay, and various suggestions have from time to time been made and discussed with a view to providing the hamlet with a proper system of sewers and efficient means of sewage disposal. The recent establishment of a new colliery, and the opening out and rapid development of a quantity of new building land in the immediate neighbourhood, have brought the question to the acute stage, which led to the matter being placed some time ago in the hands of Mr. Robert Argyle, C.E., of Ripley, and in pursuance of a scheme which that gentleman devised, a Local Government inquiry was held on Thursday, the 18th ult., before Mr. Frederick Herbert Tulloch, A.M.Inst.C.E., in reference to an application made by the Sanitary Authority for permission to borrow the sum of 3,700*l.* for the purchase of land for sewage disposal, and carrying out the works included in the scheme. The estimated cost of the public works across the Ripley branch of the Midland Railway and adjacent brook course, then southwards through a small plantation to four and a half acres of land which has been compulsorily purchased for the purpose of sewage disposal. The gradients of the district being favourable, there are no special difficulties to be encountered in the construction of the several lines of sewers, which nowhere exceed 9 in. in diameter except a short length in the outfall sewer, where the gradient is somewhat flatter. Provision is made in the various manholes for the ready flushing of any length of sewer which will ordinarily be periodically accomplished on the whole system by means of three self-acting flushing-tanks near the upper ends of the several lines of sewers. The system of "broad irrigation" has been adopted. The Inspector of the Local Government Board will report to the Local Government Board in due course.

STAINED GLASS AND DECORATION.

PAINTED DECORATIONS, ALL SAINTS' CHURCH, SOUTH ACTON.—Messrs. Powell Bros., of Park-square, Leeds, have just completed a series of fresco paintings upon the chancel walls on either side of the altar of All Saints' Church, South Acton. There are eight paintings in all, and they are arranged by carved oak frames and an arcade. The paintings on the left hand represent the Worship of Earth, and those on the right hand the Worship of Heaven, in illustration, respectively, of the texts,—"We pray Thee help Thy servants, whom Thou hast redeemed with Thy precious blood," and "To Thee all angels cry aloud, the spirits of the just made perfect." The figures are, in most instances, white, with some small portions of subdued colour here and there; and pure colour being only used in the plumage of the angels' wings. The background is gold throughout. The work was unveiled on the 28th ult.

FOREIGN AND COLONIAL.

FRANCE.—In making excavations for a road near L'An (Saône-et-Loire) the workmen have come upon the remains of a Roman canal, cut in the rock, and containing several specimens of red and black pottery.—The monument to the Lyons poet, Deschamps Souley, which is to be erected by public subscription and placed in the town, is to be completed for the site chosen is the Place Sainte-Clotilde.—The Lyons Museum has just received a legacy from the sculptor Charles Degeorge (who has been dead some years) of a fine head of "Gisana" painted by Henri Regnault.—The statue of Eugène Polletain, by M. Auhé, was inaugurated last Sunday at L'oyan.—M. M. Eude and Alphonse Schardère, Parisian architects, are to construct the national monument to Joan of Arc at Vaulprieux. The first stone is very shortly to be laid. The ruins of the chapel where she is supposed to have worshipped are to be preserved, and will form part of the pedestal on which the statue will stand.—Last Sunday the monument to the memory of Colonel Bourras was inaugurated at Pompiignan (Gard). It is the work of Léopold Morin. The monument is very shortly to be inaugurated at Laval (Mayenne) in commemoration of the last battle of the Army of the Loire in 1871. This monument is the joint work of L. Ridel, architect of the Department, and M. Eugénot, sculptor, late pupil of the École des Beaux-Arts.—In a few days the new Russian church is to be opened at Biarritz. The courses are to be worked in the Rue de Griffes, at Nîmes (Gard), the old "Porte des Eaux" has been discovered in the Roman wall which surrounds the town.—The waters of the town and fountain passed through this door and joined the river Vistre. The door, which is much damaged, is still an interesting archaeological curiosity; it has two openings 4 metres wide. The courses are in great blocks of cut stone. There are two arches which rest on a centre pier. The door is to be preserved in the museum at Nîmes.—The death is announced at Auzay (Vendée) of M. Emile Sabouraud, architect, aged fifty-five. He was a late pupil of the first class of the École des Beaux-Arts. M. Sabouraud had worked under M. Duc, in the Palais de Justice, and also with M. Quostel, when his architect was restoring the golden gallery at the Hôtel de la Banque de France. He had been member of the central Society of Architects since 1852.—The Congress of the Sociétés Savantes is to be opened at the Sorbonne on April 4, 1893.—The sudden death is announced of M. Centre, Inspector-General of Ponts et Chaussées, and Director of the State Railways. M. Centre, who died in Russia, was only fifty years old. He had achieved to represent the French companies at the International Railway Congress.

MISCELLANEOUS.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—The society visited on Tuesday last the New Cold Meat Store of Messrs. Nelson Brothers, at Nelson's Wharf, Lambeth. The store is said to be the largest in the world, being capable of bolting 70,000 sheep; it was designed by Sir Frederick Bramwell and Mr. H. Graham Harris. It may roughly be described as a brick box 150 ft. long by 50 ft. wide, and 40 ft. deep, being buried in the ground to the extent of 20 ft.; the only openings into it are at the top. Inside this brick box is a wooden one disconnected from the brick walls, and having six wooden floors in it, these being so constructed that cold air can circulate through them. In order that the unloading of the barges which receive the meat from the ships in the docks below ground may be expedited as much as possible, a 100 ft. jetty has been constructed, which with a private dock inside the wharf, enable eleven barges to be unloaded at one time. Ample provision has been made for the distribution of the meat for the purposes of consumption; as many as twenty vans can be loaded at one time. The cooling is effected by a 65 ton De la Vergne engine and apparatus, and by one of Messrs. Haslam's Cold Air Machines capable of circulating 212,000 cubic feet of air per hour at a temperature of 60 deg. to 100 deg. below zero. The store is lighted by electricity and has all the modern lifting and necessary appliances.

THE ENGLISH IRON TRADE.—There is little to lighten the gloom prevailing in the English iron market, and the prospects of improved trade seem far distant. On the Glasgow warrant market business is confined to jobbing transactions in Scotch warrants. The Cleveland pig-iron market, which lately has shown an improved tendency, has experienced a check, and prices exhibit a slight decline. The Cleveland ironmasters' returns for August record the largest production of pig-iron of any month this year, viz., 213,000 tons, 111,000 tons of which were hematite and basic, and the remainder Cleveland iron. The whole stock of iron is now 49,000 tons, a decrease of nearly 5,000 tons upon July. This is a smaller stock than during the stoppage produced by the Durham strike, before which the stock stood at 286,000 tons.

With the increase in production, and a reduction in demand, stocks must soon go on again accumulating. There are eighty-six furnaces in blast, three more than before the Durham strike. In all the other crucial centres little change is recorded. The manufactured iron trade is practically lifeless, and the tinplate branch is depressed. In the steel trade very few transactions are recorded, and in some cases prices are considerably undercut. Shipbuilding generally is dull, although a few new orders are reported in the Scotch district, where the largest vessel, with the exception of the *Great Eastern*, was launched yesterday (Thursday). Engineers and ironfounders continue quiet. The coal trade is slack.—Iron.

CREMATION.—We understand that in view of the probable great advancement of the practice of cremation in England the General Cemetery Company have erected a Columbarium for the reception of cinerary urns at their cemetery at Kensal-green. The structure is placed in the monumental chambers, and contains accommodation for forty-two urns. There are three tiers of compartments on each of the four sides, and each one is enclosed by a metal lever-locked door fitted with plate glass. The fronts are in Caen stone, with paneled pilasters at each angle, and moulded base and cornice; the shafts between the compartments are of polished Sienna marble, and the panels in the pilasters filled with polished rouge Royale marble. The Columbarium has been built by Mr. E. M. Lander, of Kensal-green, from the designs of the architect, Mr. Robert Wilby.

CONSISTORY COURT OF LONDON.—On August 29 Dr. Tristram, Q.C., Chancellor of the Diocese, granted an amending order in respect of the Bancroft tomb, on the floor of St. Helen's, Bishopsgate, which church is now being extensively restored under the direction of Mr. J. L. Pearson, R.A. Francis Bancroft, *obit* 1727, caused that obstructive and tasteless structure to be erected in 1723, charging the Drapers' Company with its custody, and stipulating that they should once a year visit the tomb and inspect his embalmed remains. In December last year a faculty was given for the making of a chamber or vault underneath the tomb, and the setting up of a memorial tablet on the adjacent wall of the Nuns' Aisle. The latter order, obtained at the Company's instance, provides for the construction of a brick vault to contain the coffin, and the substitution of an inscribed slab or other suitable memorial instead of the present tomb. Bancroft, who enjoyed no very good reputation, left most of his property in trust to the Drapers' Company as endowment for their schools and almshouses in the Mile End-road, removed a few years ago for the building of the People's Palace. On the 2nd instant the Chancellor issued faculties for the construction of transformer chambers, for use of the City of London Electric Light Company, in the churchyards of St. Benet Fink and St. Nicholas Cole Abbey, no other positions being available for their requirements. The Company are under a contract to light the City streets for an annual payment by the Corporation of 20,000*l.*, upon completing their system. They want a site within fifty yards of the site of St. Benet Fink in order to supply the 7,000 incandescent lights, including 1,200 in the Bank of England, already asked for, and another to meet an estimated demand for from 20,000 to 25,000 lights in the Queen Victoria and Upper Thames-streets district. The Court imposed the customary conditions as to re-interment in consecrated ground, at Iford or elsewhere, of any human remains disturbed by the Company's operations, and the Company undertake to contribute 20*l.* and 25*l.* towards the church services respectively. By a local Act, 5 & 6 Vict., cap. 101, the church and churchyard of St. Benet Fink were vested in the Mayor and Corporation for an extension of approaches to the Royal Exchange. It stood in Threadneedle-street, next to the block comprising the Bank of Australasia, at the corner of Finch-lane, built after P. C. Hardwick's designs. In 1854-5, upon ground belonging to, we believe, St. Thomas's Hospital. St. Benet Fink was built by Wren, at a cost of 4,129*l.* 16*s.* 10*d.* It is thus described in the late George Godwin's "Churches of London" (1839):—"The arrangement of the interior of the building is peculiar. The external walls describe a decagon, within which six composite columns form a parallel aisle in the centre, and support a small elliptical cupola. An ill-proportioned entablature proceeding from the side walls is received on each column. The spaces between the columns are arched, as are the east and west ends of the aisle, thus forming a series of arched recesses round the building, which have a singular effect. It has been pointed out as a fine specimen of its author's genius, but, excepting so far as regards the adaptation of means to circumstances we can discover little genius in it. As a whole, the composition is crowded and confused, and in the details there is nothing to admire." The tower at the west rose to a total height of 101 ft.; it carried a belfry with large oval openings, a leaden swelling cupola, and a lantern. The parish is now united with that of St. Peter-le-Poor, Broad-street.

NEW ESPLANADES AT WALTON-ON-THE-NAZE.—The new esplanades and sea-defence works at

Walton-on-the-Naze were recently "publicly opened" by the local Member of Parliament. The frontage dealt with is some three-quarters of a mile in length. According to the *Essex Standard*, to fill in the gulfs and chasms in the frontage would have entailed a heavy outlay. It was therefore decided to come into them and put the works in carrying forms in front, to give a gentle access to the works at both ends, and to form a continuous promenade from the pier approach to Raglan House, with continuations at either end, and in front of the railway-station to put a sea-wall with promenades and esplanades with protecting stone and hurr groynes. In the centre of the town a smaller groyne has been completed, with a broad slipway to the beach. The sea-wall, to hold up the Marine roadway, is some 27 ft. high in the centre part from the foundations to the top. The promenade is about 21 ft. wide, and in front of this is a sloping wall, up and down which the sea runs freely. Besides these works, a great deal has been done to strengthen the walls opposite Pier Crescent and Raglan House, buttresses having been built, sloping filled in, and aprons to the footings repaired. The new defences at the foot of South Cliffs comprise sloping stone sea-walls 580 ft. run, and an extension in bury walling of 350 ft., with other work at the end to complete this, making together 930 ft. of new sea defences on this side of the town. On the top of this is a promenade in two sections of 9 ft. wide and 12 ft. wide on a slope, so that the sea that goes upon it in rough weather shall easily run off. A roadway is partly made between the top of this and the cliffs. At Burnt House the groyne has been cut down and made a solid structure, and at the boundary of Walton a much stronger groyne has been built, 300 ft. long. Mr. S. E. Goslin, of Walton, was the engineer.

FIREPROOF CONSTRUCTION.—We are informed that some experiments in a new style of fireproof construction were recently made at the premises of Stuart's Granolithic Paving Company, Limited, Limehouse, under the direction of Mr. P. Stuart, the Managing Director of the Company, Mr. Thomas, of Westminster, being the referee. Mr. Stuart explained that the granolithic fireproof flooring, which was to be tested, was similar to that of which granolithic paving is composed. None of the slabs to be tested would be thicker than 2 in., and it was claimed that with this new stone they could span 16 ft. without the aid of iron beams or girders. The tests were then proceeded with, and, we are informed, among the results obtained were the following:—One granolithic slab, 5 ft. 8 in. by 7 ft., with a rise at the centre of 5 1/2 in. supported between two joists, was loaded with 8 tons, which remained thereon until twelve o'clock the following day, when additional weight was added, bringing the total load to 15 1/2 tons. This load was left for two days longer, but the stone did not break, crack, or show any other sign of failure. With a load of 8 tons a deflection of half an inch was produced, and with a maximum load of 15 1/2 tons the deflection was increased to 5 in. Then a second slab, flat, was fixed under the same conditions. It carried 12 tons, or a load equal to 6 tons 7 cwt. per square foot. A third slab of the same dimensions, supported on all sides by wooden joists, was next tested by a falling load. A piece of granolithic weighing 2 cwt. was dropped from a height of 7 ft., producing an impact of 2 tons 2 cwt. In the first fall the weight did not fall quite vertically, one corner striking the slab, which only produced a small triangular hole, but without causing any crack. A second blow of the same weight struck it fairly close to where the first had been delivered; this merely enlarged the hole, and no crack was visible. A third blow directed to a different point of the slab knocked a piece off, but still failed to produce a crack or breakage. After the experiment a careful examination failed to show any permanent set in the slab. By way of contrast, a slab of York-landing, 3 1/2 in. thick, was placed with bearings on two sides, but it broke with a load of 3 tons 2 cwt., or a load equal to 1 ton 7 cwt. per square foot. A granolithic lintel 9 ft. long and 6 in. deep was then tested, and it carried a load of 3 1/2 tons.

THE METROPOLITAN RAILWAY EXTENSION TO AYLESBURY.—The extension of the Metropolitan Railway Company's system to Aylesbury was formally opened on the 1st inst. to public traffic. The extension starts from Chalfont-road, the junction of the Chessham line, passes over the intervening undulations into the Amersham Valley, and through the Shardloes estate to Great Missenden, where a station has been built. Thence the line traverses the Valley of Wendover, goes through a deep cutting, and over a flat country through Steke Mandeville to Aylesbury. The total cost of this extension is amounted up to about 350,000*l.*, or 22,000*l.* a mile. The whole of the sky-lights over platform, goods stations, &c., have been glazed on Messrs. W. E. Rendle & Co.'s patent system. The line has been constructed from the plans of Mr. Gates by Mr. J. T. Firbank. At Aylesbury the extension comes into connexion with the Aylesbury and Buckingham line, which extends northwards to Quainton-road, at which point the junction with the new line of the Manchester, Sheffield, and Lincolnshire Railway will be made.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENT.

COMPETITIONS.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered. Includes items like Local Board Room, Offices, &c., Public Offices, and Technical Schools.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Includes items like Cottages, Trenching, Pipe Sewer, Alterations, &c., and various construction works.

CONTRACTS.—Continued.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Includes items like Alteration to House at Cemetery, Broken Granite, Public Baths, and various engineering and construction contracts.

PUBLIC APPOINTMENT.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applicants to be in. Includes the position of Surveyor and Inspector of Nuisances.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., & viii. Public Appointment, p. xviii.

AUSTRALIAN CEMENT.—The Government having announced their intention to use only locally-manufactured Portland cement in connexion with the projected Happy Valley Reservoir works, the hydraulic engineer (Mr. Bayer, C.E.) tested the cement of the South Australian Portland Cement Company at the Waterworks Yard, Thebarton. For this purpose he selected some briquettes made nine months ago, the official test of which is 550 lb. to the square inch. The average result was 747 lb. tensile strain to the square inch. From the next lot of briquettes, made a few days later, the average result was a tensile strain of 822 lb., and one of the briquettes could not be broken at all by any strain to which it could be subjected by the machine, the superincumbent column of masonry being lifted up and scattered about over the counter at a pressure of over 950 lb. to the inch—the greatest pressure on record. The third lot of testings averaged over 870 lb. to the square inch. The hydraulic engineer expressed his satisfaction at a result which was quite unparalleled in the recorded tests of the department. —South Australian Register.

APPOINTMENT.—At a meeting of the Board of Management of the Midland Deaf and Dumb Institution, Derby, held on the 5th inst., the Mayor of Derby in the chair, Mr. W. J. Phillips was appointed clerk of the works for the new Institution, now in course of erection in Friar-gate, Derby, at a cost of over 11,000l.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held in the rooms, 214, West Campbell-street, on Tuesday evening, the President in the chair. After the ordinary business was transacted, Mr. Chas. R. McIntosh read a paper descriptive of his tour in Italy, while he was the recipient of the Alexander Thomson Travelling Studentship. His route took in, amongst other places, Naples, Palermo, Rome, Orvieto, Siena, Florence, Pisa, Lucca, Bologna, Ravenna, Venice, Padua, Vicenza, Verona, Milan, and Pavia, the principal buildings in each of which he noted and criticised. The paper was illustrated by a large collection of pencil and water-colour sketches, and some good photographs.

LEGAL.

INSANITARY CONDITIONS IN "MODEL" DWELLINGS.

THE VESTRY OF SHOREDITCH v. PILBROW.

This important case was recently decided, after being five times before the Magistrate at Worship-street Police-court. It arose on a summons taken out by the Vestry of St. Leonard, Shoreditch, against a Mr. Pilbrow, to recover the sum of 209l. 7s. 6d., the cost of work done by the Vestry at a block of "model" dwellings known as Norfolk-buildings, belonging to Mr. Pilbrow.

A résumé of the case, given in the Hockney Mercury, shows that on October 15, 1891, the Chief Sanitary Inspector, Mr. Alexander, discovered that a drain under a bedroom was opened, and the space under the floor flooded with sewage, and it was

alleged that this had happened several times before, and was not made known to the Inspector; it was also alleged that similar nuisance had occurred in several other tenements. These facts being reported to the Vestry, an order was made requiring the owner to reconstruct the drain; some difficulty appears to have arisen in serving the notice upon Mr. Pilbrow personally, as required by the Act. This was, however, done on November 13. The nuisance referred to, having been temporarily abated, on receipt of the notice, it further appears that Mr. Pilbrow instructed a surveyor to make plane and specification, but negotiations for the execution of the works were unduly protracted, and nothing was done until the Vestry entered on February 5, 1892.

Mr. Rose (the magistrate), in giving judgment, said Mr. Pilbrow had set up the various pleas that he was not the owner, that the work done was altogether unnecessary, and that work was done that was not specified in the notice. The case of the Vestry set forth that on inspection they found the drains in bad order, and they served notice on requiring him to amend and reconstruct the defective drains, and in February, 1892, nothing having been done by Mr. Pilbrow to amend the conditions complained of, the Vestry entered upon the premises under the power given by Sec. 85 of the Metropolitan Local Management Act, and work was done to the value of 209l. 7s. 6d., which sum the Vestry had paid, and now sought to recover. It was alleged on behalf of Mr. Pilbrow that this sum was excessive, and that the Vestry should have contracted for the execution of the work. As to these contentions, he was of opinion that the bill was not excessive, and that the Vestry was not obliged to contract in order to get the work done cheaply, and perhaps nastily. As to the inspection chambers being constructed that were not specified, he found that the notice required all necessary works to be done, and it was a matter of common knowledge that inspection chambers were a necessity of modern drainage. Mr. Pilbrow had also set up the objection that he was not the owner; but if he really were not the owner, nothing would have been more easy of proof than to amend and reconstruct the defective drains, and in February, 1892, nothing having been done by Mr. Pilbrow to amend the conditions complained of, the Vestry entered upon the premises under the power given by Sec. 85 of the Metropolitan Local Management Act, and work was done to the value of 209l. 7s. 6d., which sum the Vestry had paid, and now sought to recover.

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[This report was accidentally overlooked last

week. We give it now on account of the importance of the case.]

ANCIENT LIGHTS.

JOHN G. JOICEY v. NORTH-EASTERN RAILWAY COMPANY.

This arbitration case was held in Newcastle-on-Tyne on the 3rd and 4th ult., the umpire being Mr. Robt. Vigers, of London, the arbitrators being Messrs. Fessenden and Mr. Thos. Gow. For the claimant there appeared as counsel Mr. Cyril Dodd, Q.C., M.P., as solicitor, Mr. C. E. Cadle (representing Messrs. J. G. Wilson, Ormsby, & Cadle, of Durham), and as expert witnesses—Mr. James W. Frazer, A.R.I.B.A., Mr. E. E. Clephan, Mr. John Ferguson, and Mr. W. S. Armstrong, of Newcastle. For the Railway Company there appeared as counsel, Mr. Fletcher Moulton, Q.C., with, as junior counsel, Mr. Hugh Boyd, as solicitor Mr. A. Kaye Butterworth, the Company's own solicitor; and as expert witnesses—Mr. Chaffield Clarke, F.R.I.B.A., of London, Mr. Henry Carrick, Mr. J. Potts, and Mr. Geo. Irving, of Newcastle. This was a case in which the claimant's property, containing ancient lights, is situated in Pottery-lane, Newcastle, having a 30-ft. street between it and the railway company's Forth Goods Station. The railway company formerly had a wall opposite about 17 ft. 9 in. high, and in extending their goods station under statutory powers they pulled down this wall and erected their station to about 20 ft. It was pointed out by the claimant that that amount was inadequate, as the same amount of floor-space would have to be retained, therefore the back wall would have to be set back 3 ft., and the roof and floors taken down and replaced, perhaps with new materials. This alteration would, it was argued by claimant, cost at least about 2,500l., and then not give the same light as before enjoyed. The claimant claimed 5,400l. on the ground that, having prepared a scheme for the improvement of the property in the form of warehouses, offices, and sample-rooms, he was prevented from carrying it out, as the risk would be too great, seeing that the majority of the light which he required for the offices and sample-rooms would be taken away, and the claimant amount he had lost through having to abandon the scheme. The railway company argued that the scheme would not be interfered with to the extent that claimant set forth. The award was taken up by the railway company on the 29th ult., and was found to amount to 1,215l.

LONDON—For the erection of boiler-houses, with chimney-shaft, at Sandwell, for Messrs. Wickens, Pease, & Co., Ltd. Mr. J. Woodall, architect. No quantities supplied.

Ashby & Barrer £250 0 Charles A. King £250 0
 Pusey & Lamley 500 0 Charles 510 0
 Perry & Co. 500 0 Robinson 570 0

LONDON—Accepted for alteration to Church House, Parcher-terrace, Baywater. Mr. W. D. Church, architect, 12, South-place, Finchley.

F. T. Clinchen, Kenal Green. £220 0 0

NEWCASTLE-ON-TYNE—For re-building the "Baedens" Inn, and new wash-houses and offices, Newcastle-on-Tyne, for Mr. G. V. Charlton. Mr. Arthur Stockwell, architect, 11, Pilgrim-street, Newcastle-on-Tyne. Quantities by Mr. George Bell, Quantity Surveyor, Collingwood-street, Newcastle-on-Tyne.

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H. Walker & Co.	498 4 0	H. Simpson	450 16 6
T. Jamieson & Co.	472 0 0	G. Hand	442 0 0
Threlkeld & Wallace	469 8 0	R. J. Charlton	440 0 0
J. France	451 10 0		

Painters.

J. France	75 18 6	Kirk & Dickenson	73 10 0
Hewitson	71 10 0	C. Nicholson	69 14 0
Beck & Son	70 17 6		

Painter and Glazier.

W. Cuthbertson	308 10 0	J. R. Richardson	234 0 0
J. Leavelle	252 8 0	W. Campbell	235 0 0
A. Robertson	245 2 0	J. O'Brien	210 0 0
J. Rowell	240 0 0	W. Copland	207 0 0

REIPHAM (Northall)—For new school and master's house, for the Harkford and Whitwell W. J. school. Messrs. Exley & Olley, architects, Great Yarmouth. Quantities by architects.

F. T. Howard £2,500 0 0 R. Bates £2,270 0 0
 S. W. English 2,506 15 0 S. Hipwell 2,100 0 0
 J. Nash 2,480 0 0 T. H. Dyer, Foul- 2,085 11 0
 H. E. Hayes & Son 2,350 0 0 J. Shaw 2,029 10 0
 W. Chapman & Son 2,200 0 0
 Architects' estimate, £2,075.

RUDWICK (Russey)—Accepted for the erection and completion of a pair of cottages, for Mr. P. Barker. Mr. W. H. Harrison, architect, 2, Newcourt, Lincoln's Inn.

F. T. Clinchen, Kenal Green. £200 0 0

WOLVERHAMPTON—For the erection of a higher grade school, Wolverhampton. Mr. P. H. Fleming, architect, 5, Waterloo-road, Wolverhampton.

Willcock & Co. £11,701 10 0
 Hovley & Son 11,549 10 0
 Guest & Son 11,420 10 0
 Architects' estimate, £10,789.

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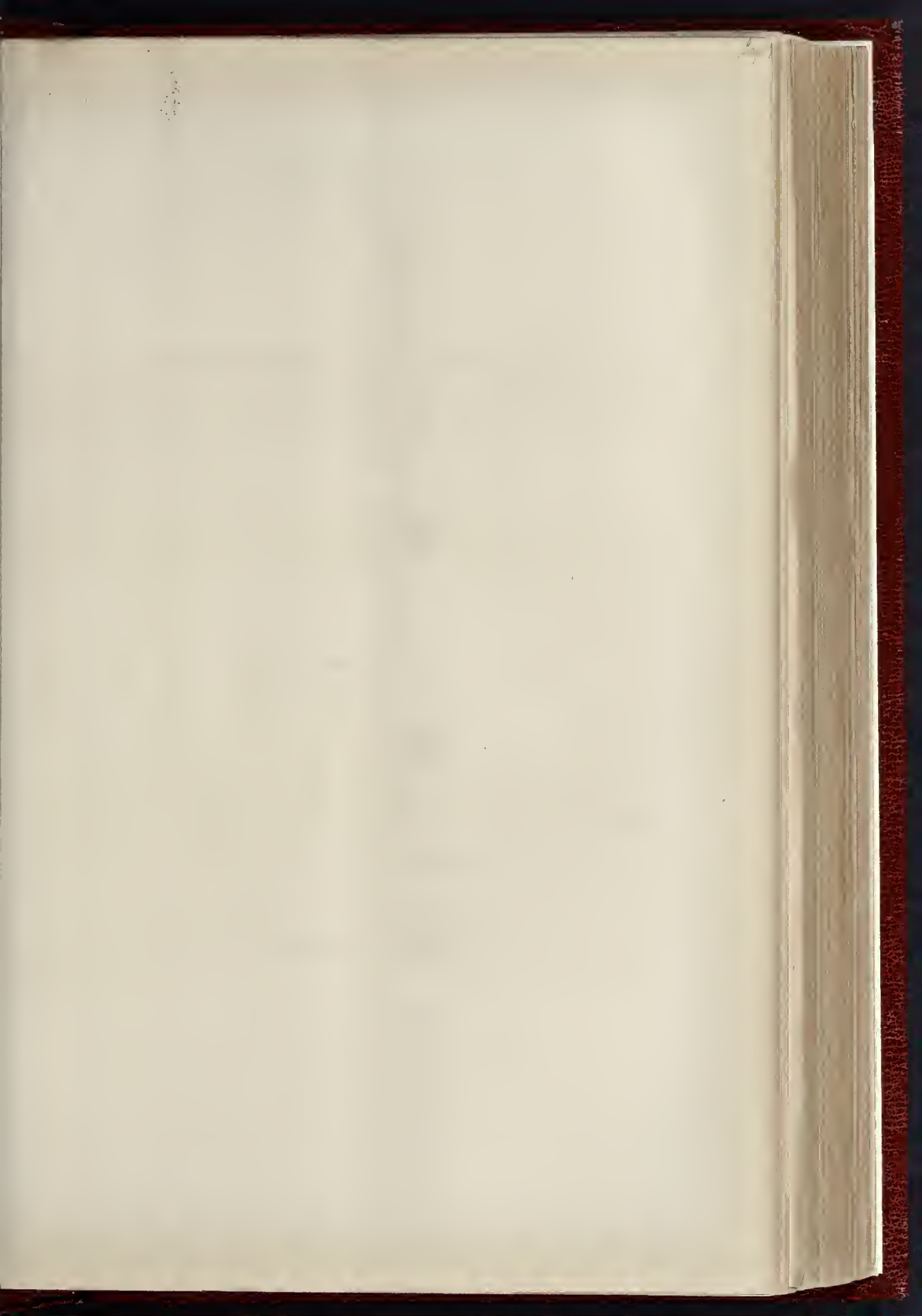
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The Builder.

VOL. LXIII. No. 2389.

SEPTEMBER 17, 1902.

ILLUSTRATIONS.

Frieze: "Amores Caprarli."—Designed by Mr. John S. Babb	Extra Large Size Ink-Photo.
St. Bartholomew the Great, Smithfield: Exterior View of New North Transept.—Mr. Aston Webb, F.R.I.B.A., Architect	Double-Page Photo-Litho.
St. Bartholomew the Great, Smithfield: New North Transept.—Mr. Aston Webb, F.R.I.B.A., Architect	Double-Page Photo-Litho.
St. Bartholomew the Great, Smithfield: New South Transept.—Mr. Aston Webb, F.R.I.B.A., Architect	Double-Page Photo-Litho.
Ground Plan of St. Bartholomew the Great, Smithfield.	Double-Page Block.

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Architecture of the Isle of Wight.



THE two concluding sections of Mr. Percy Stone's monograph of the architecture of the Isle of Wight are now issued,* and the whole book surprises one by the evidence it furnishes of the number of old buildings of more or less architectural interest which are included within the limits of this small island. The architectural remains of the island are not, it must be admitted, of very varied interest; there is a considerable sameness in the character of many of the small churches and manor houses, and the celebrated Castle is the only monument of first-class importance in the island. Yet the manor and farm houses, which perhaps are of more interest than the churches, have a peculiar charm in their quiet and unostentatious picturesqueness, and the project of making a complete illustrative collection of the ancient architecture of an island which occupies such a unique position, as a kind of outpost of southern England, and is so beloved by its inhabitants, was certainly worth undertaking, and has been very well carried out in the production of a book which will have a distinct value in any architectural library.

The East Medina or division of the island, as our readers may remember, was treated of in the first two parts of Mr. Stone's work, and the remaining two parts deal with the West Medina, the central object in which, both architecturally and historically, is Carisbrooke Castle, which naturally occupies a considerable portion of the fourth volume, in which it is grouped with domestic architecture, the third volume being occupied with the ecclesiastical architecture of the western half of the island. As in the case of many other famous castles, the site was probably a

fortified one from a much earlier date than that of the Medieval castles; the earthworks of an earlier period are still discernible, and doubtless Mr. Stone is right in his suggestion that the Romans had a camp in the island (a kind of outwork of the country which they would by no means have neglected), and that here was its position. The actual huilt Castle, however, dates its commencement, like the majority of our castles, from the incoming of the Normans, and it is from this period naturally that the author starts his description and notes, from various sources, on the history of the Castle, in the great hall of which it appears that William the Conqueror, in 1082, arrested his half-brother Odo on the eve of his embarkation for Normandy. We must refer the reader to the book for the succeeding steps in the history of the building, in tracing which the author has collected together into a short story the substance of a good many records which are derived from scattered and multifarious sources, and among which are included various characteristic incidents of Medieval life and warfare. For the two centuries between Richard II. and Elizabeth, however, we are told that documentary evidence is wanting; but in the time of Elizabeth the castle occupies a prominent position again, having been strengthened as one of the bulwarks against Spanish invasion, and the Italian engineer Giannihelli was sent down from London to superintend the new fortifications. The accounts for all these works, says the author, are in the Public Record Office in detail. A considerable extract from these accounts is given in the Appendix, "John Leigh, Esquier" being named as "paymaster of the fortifications within the sayde Ile of Weichte," and (with the characteristic lawlessness of spelling of the day) "Signior Gennyhelly" or "Gennyhelle" as the engineer in charge. Some of the items are interesting both as throwing light on what was done and on the charges for work at the period. John Pier-son receives, "to make ye way to runne out of the north-east Curtin on the Flanke of the north Bullwoorke and to take awais hlacke earth in ye hottoms of the Barbanck of the South East Curtin," 5s.; and Richard More, "for takinge awaye ye copinge stones of the

plattforme and layinge them upon the greene before the Castell gate in length cxl. foots," 2s. 6d. Was this in preparation for replacing them after repaire to the walls, or for any use in the spot in which they were placed? No direct explanation of it is given, but probably the object was to keep them out of harm's way and replace them, as we find a note further on that "Michell Demearc and his companie" were to "cast down this piece of the wall upon the platforme hefors ye castell gate in length lx. footes," which accounts for the moving of part at least of the coping-stones. The larger sums named in the accounts show that a considerable amount of work was done; for the "North East Curtin" was find 149l. 13s. 2d. put down, and for the "East Bullwoorke and ij Casamatts" (casemates) 32l. 6s. 3d.; and "sondrie pyoners" for earthwork about the "South East Curtyn" received 120l. "Ffederico Gennyhelly" receives 4l. for his "riding charges from London to Newport," and his ahode there till the commencement of the work, and afterwards 4l. "for riding charges from Newport to London, and going over to the New Forest to ses after the timber."

In regard to the illustration of Carisbrooke, the author is able to reproduce a plan of the castle as it was in the fifteenth century; a plan made in 1741, and in the possession of the Engineer's Department, at Portsmouth; and a plan from a survey made in 1851 by W. T. Stratton. To these are added detailed plans to a larger scale of the Gatehouse, and of the residential portion of the castle, the latter shaded to show the dates of the various portions. There was little variation during the three centuries covered by the plans reproduced, in the general outline of the works, which show more than usually the irregular lining out of the walls following the run of the ground; this is not confined to the *enceinte* walls, but even the keep (in most cases a square, a circle, or a parallelogram, in the midst of the irregular enclosure of the *enceinte*) is here an irregular pile of no definable outline in plan, a kind of random enclosures following the form of the ground, and having a dozen sides of all lengths and at all angles. The architectural illustration of the Castle is very complete; we have an

* "Architectural Antiquities of the Isle of Wight from the Eleventh to the Seventeenth Centuries." Collected and drawn by Percy G. Stone, A.R.I.B.A. Published by him at 16, Great Marlborough-street, London. Parts III. and IV.

whose principal officer happens to be many years behindhand in the knowledge of the subject which it is his business to control.

If drainage matters were placed under one central authority, it might still be a matter for argument whether or not their regulations embodied the best possible practice, but in London the regulations of many of the vestries are so inconsistent with each other that if some of them are right others must certainly be wrong. It follows that the householders in many large and important areas in London are being forced to adopt what is considered by different vestries as faulty or antiquated sanitation on the one hand, or new-fangled and unsatisfactory sanitation on the other. We think this state of things should no longer be allowed to exist, and the sooner it is remedied the better.

Two of the principal points upon which there is a difference of opinion in these conflicting regulations are the diameter of the pipes to be used for house drainage and the materials of which they should be made.

When old methods have become obsolete, the arguments by which they were supported are forgotten, and it often becomes a matter of wonder as to what could have induced their advocates to stand sponsor for them at all. When the plans of the present home of the Institute of Civil Engineers were under discussion, the united wisdom of the Council of that day came to the conclusion that no less a diameter than 9 in. was required for the drainage of that by no means extensive building. Perhaps this conclusion was the result of a compromise, and we are left to imagine what the suggestions must have been which emanated from those who believed in brick sewers of 2 ft. or 3 ft. in diameter as the proper arrangement to adopt. Now a diameter of 9 in. is universally condemned as being too great even for much larger buildings, and we are left to speculate upon what the arguments could have been which were urged in support of it, and this brings us to a consideration of what is being accepted now by those who are best entitled to give an opinion.

The grounds for forming a judgment are not very far to seek, and, starting with the proposition that the smaller the pipes are the better, so long as they provide for a maximum discharge, we shall find an answer among the most familiar formulae. As a matter of fact, one well-known sanitary expert has used pipes of only 5 in. diameter for the largest London houses during the last ten years, and another has been recently advocating the use of cast-iron pipes only 4 in. in diameter for taking the discharge from houses having as many as twenty inhabitants, including roof and surface water; and there is no doubt that for all practical purposes the smaller diameter, with a good fall, is sufficient, even allowing for exceptionally heavy rainfalls, from areas up to 10,000 square feet. What more is wanted it is difficult to imagine, and yet, in the face of both experience and theory, there are London vestries who will allow no less diameter than 6 in., even for the smallest houses within their jurisdiction.

The other principal point of difference refers to the materials of which the drains for town houses should be made. During the last ten years heavy cast-iron pipes protected with Dr. Angus Smith's anti-corrosive solution have been coming into vogue for the drainage of town houses, and for one that was dealt with in that way, even five years ago, there must be fifty now. The preponderance of advantage in favour of this material is so great that even those who at one time were opposed to their use are now recommending their adoption, and at least one of the London vestries is desirous of making their use compulsory, as has already been done in the case of certain towns in the United States of America.

In spite of all this certain vestries do not even allow architects a choice in the matter, and prohibit the use of iron altogether.

The more-advanced practice of enlightened vestries only throw the action of incompetent surveyors into stronger relief, and we

trust that before long they will at least allow householders who have taken competent advice to carry it into practice at their own risk.

In the face of the difficulties which arise from contradictory regulations, we would suggest that there should be a convention of the different vestries called together for the purpose of uniting upon some generally-accepted code of rules which should embody the most improved methods, so that the unfortunate householder, after he has paid for good advice, should not be prevented from putting it in practice.

NOTES.

THE Trades Union Congress disposed of a great deal of business at Glasgow last week,—that is to say, they passed a great number of resolutions. The carrying out of many of these devolves upon the Parliamentary Committee, who were overwhelmed with suggestions and instructions, and whose position, judging from the proceedings at the Congress, is somewhat unenviable. "No man can serve two masters," and when the views of a Labour Member's constituents differ from those of his trade union or the Congress, he has to make his choice as to which he will hold to. A great feature of the debates was the defence of certain members who had had the misfortune to offend a large proportion of the delegates from this cause, and their position was upheld with a fearless dignity which was highly creditable, and was evidently appreciated by an assembly which would promptly have condemned the offenders had their defence been less sound, or their attitude betrayed the slightest vacillation. Equally creditable were the utterances of those delegates who had the temerity to oppose the Eight Hours Bill, which, a Durham delegate declared, he had received an emphatic mandate from the miners of that county to oppose on every occasion. Seeing that this is the county in which,—at large works in Sunderland,—an eight hours day has been voluntarily adopted and proved successful, the attitude of the Durham men may be better understood from the remarks of a succeeding speaker. He explained that although they opposed the proposal for a legislative enactment, they were in full sympathy with all trades unions who sought to reduce the hours of labour; but that their confidence was in "Self-help and manly independence." One of the Parliamentary Committee's many instructions is to prepare a scheme for independent labour representation,—the word "independent" only being adopted by a majority of one vote. The difficulties will probably be found very great, and the benefits problematical, though there is certainly no lack of precedent for a small independent party achieving great things,—especially when the larger, and more powerful, parties are pretty evenly balanced. The country has nothing to fear from the formation of such a party, provided the members of which it is composed recognise that "rights" exist besides those of labour; and that while insisting upon the one, it would be but perversion of right to ignore the other. Mr. Burt set a good text for his fellow Labour Members,—and, indeed, to all legislators,—when he said that "the labour problem is, in its very essence, a moral problem. Higher character, nobler conduct are wanted all round. The faults are not wholly on one side, nor are the virtues."

THE Berlin press has given very full particulars of the biennial gathering of German architects and civil engineers which took place at Leipzig during the last days of August. As usual there was a combination of official meetings at which a few papers were read, then a good deal of sight-seeing and a still greater amount of banquetting and general amusement. The customary lecture on the history of the city visited by the societies was given by Professor Schreiber, of

Leipzig, whilst the two leading papers of the year's gathering were read by Professor Hubert Stier and Herr Launhardt, both of Hanover, the former describing the progress of architecture in Germany since the first gathering of architects in 1842 (also held at Leipzig) until the present day, the latter giving particulars of the development of traffic in the same period. Nearly all of the many interesting public buildings Leipzig can boast of were visited. Special attention seems, however, to have been given to the new Municipal Buildings, the new University Library, the Booksellers' Exchange, and the Imperial Law Courts which are in course of erection. One or two architects who had been present at the first gathering in 1842 took part in the one now held on the fiftieth anniversary, and naturally were received with enthusiasm.

THE monument erected on the Brühl terrace at Dresden in memory of Gottfried Semper was unveiled with much ceremony at the beginning of this month, a large contingent of the architects who had attended the biennial gathering at Leipzig being present. It is due to the initiative given by the central committee of the amalgamated Societies of German Architects and Civil Engineers (whose members subscribed £1,000) that the monument is now to be seen; at the same time it should be mentioned that the King of Saxony gave the very appropriate site on which the memorial stands, in front of the New Academy buildings, and that the Municipality of Dresden, which had already founded a valuable scholarship in the name of the deceased artist, added the sum of 2500 to the fund. The monument consists of a bronze statue of Semper on a pediment of red granite, the latter designed by Herr Baurach Giese, of Dresden, and the former cast from a model by Professor Johannes Schilling, of the same city. The figure stands with one foot resting on a piece of enablature, and in his hands is an open sheet, on which the outlines of the new Dresden Opera House are defined. On the pediment the name of the deceased artist is cut. There is no other inscription. In the course of the ceremony Professor Lipsius Semper's successor to the Architectural Chair at the Saxon Royal Academy, gave an excellent description of the life and work of his predecessor, and on the same occasion a special Semper Exhibition was opened. This collection contains many drawings and sketches of the deceased architect, as well as a number of portraits, awards, and diplomas received, and publications pertaining to his life. The Exhibition, which has been arranged by a former pupil of the great master, has been divided up into groups representing periods of the deceased's life, beginning with a large collection of studies drawn whilst in a Paris atelier (1827 to 1830), and his travelling sketches of the years 1830 to 1833, and then continuing with his work in Altona (1833-1834), in Dresden (1834 to 1849), in London and Paris (1849 to 1855), and in Zurich, Vienna, and Dresden (1855 to 1878). It is a satisfaction to see how the memory of a distinguished architect is honoured on the Continent.

A RATHER startling suggestion about Stonehenge has been entered into at some length by Captain Pasfield-Oliver in some communications to the *Times* during the last few days, to the effect that the large stones now *in situ* are only the main masonic framework of what was once an enclosed and roofed-in temple, the remains of the roof and of the filling of the walls having perished or been removed in the course of ages. Captain Pasfield-Oliver has evidently made a detailed study of remains of this kind in different parts of the world, but he seems to have been reasoning from the evidence of structures of much smaller size and not quite the same character. Two objections must at once occur to an architect. First, that some remains of the filling of the walls must, according to all probabilities, have remained

on or near the site in such a case; secondly (which is much more important) that the existence of such filling-in masonry between the large stones must have left some sign on the jambs of the latter, and that no existence of any marks of the kind is pretended to have been discovered. The further question arises, if the structure were roofed, what kind of roof can we imagine for it? The probabilities would be in favour of large stone slabs, but these would have been as difficult to carry away, or destroy all traces of, as the trilitheons themselves. We cannot therefore regard the suggestion as one which is to be seriously entertained.

ON May 2, 1891, we published the general results of an interesting series of experiments made by Mr. Kirkaldy on the strength of concrete beams in which iron rods had been embedded in the manner patented by Mr. F. G. Edwards for the purpose of increasing the strength of those parts subjected to tensional stresses. The rods are embedded along the portions of the beams which are in tension, and are either turned up at their ends or corrugated to increase their hold of the concrete, since upon this hold the longitudinal tension they are able to take depends. Mr. Edwards, who has now completed his invention, points out that this connexion can also be made by screwing on a nut with a washer at each end of the rods, and this appears to us to be a more satisfactory manner of securing them. After the experiments above referred to there can be no doubt that the strength of concrete beams, as well as their ultimate deflection under loading, is very considerably increased by the introduction of the rods, but we do not think it is a form of construction likely to inspire very much confidence, and we doubt if the cost of the beams would compare favourably with that of mild steel rolled joist of equal strength. At the request of the patentee, we have given further careful consideration to the principle and to the detailed provisions of his patent, but on the whole we feel bound to say that our opinion remains very much as it was expressed in the article above referred to, written immediately after witnessing the tests at Mr. Kirkaldy's works.

A REPORT to the Local Government Board by Dr. Parsons* (dated June 24), in reference to an outbreak of typhoid fever at Newfield, in the district of the Asby Woods Local Board, differs from most reports of this kind in not tracing the disease directly to defects in drainage, which appears to be in a less unsatisfactory condition than it is usually found to be in such cases; but the causes at all events appear to have been preventable, and to have been closely connected with the arrangement of buildings and their surroundings. The Report says:—"Given a washhouse used in common by the whole row of houses, and in which the soiled linen of the first cases was washed; a back yard, also common to the whole row, with surfaces in part unpaved and ill-kept; a deficient water-supply; and people of the mining class, careless in matters relating to health, it is easy to think of numerous ways in which the infection of enteric fever might be transmitted." In regard to the water-supply, however, we have the old and constantly-recurring complaint in country districts of insufficient and distant water-supply, placing every difficulty in the way of procuring an adequate daily supply—

"The water-supply of Newfield is very scanty and inconvenient of access. The water in use comes from the Moira water service (which is derived from a spring at Willesley), and is delivered into an iron tank, consisting of an old upright boiler, from which it is drawn by a tap. The tap is kept locked and is only accessible for a short time twice a day, at which times people have to gather around the tank with their buckets, waiting to take their turn when the tap is unlocked. The tank stands among the old pit heaps a considerable distance from the houses; the reason, it is said,

being that the level to which the water will rise will not allow it to be placed any nearer. From New Row the tank is 300 yards distant, and the path from it is uphill. Since the fever, however, an additional supply for washing purposes has been brought by a cart and delivered into a tub by the washhouse; but drinking water is still fetched from the tank."

ANOTHER report by the same hand (dated June 27), in regard to the prevalence of enteric fever and diphtheria in the Ashby-de-la-Zouch Rural Sanitary District, brings to light once more two of the most common predisposing causes of disease, viz., middens not cleared regularly, and wells not sufficiently isolated from coakage. In regard to the first point we read:—

"The privies either are of the midden kind, sometimes with a horizontal partition in the Lancashire fashion, to separate the receptacle for ashes above from that for excreta below, or they have large underground vaults. Owing to the bottoms of the privy pits being below the ground-level, and sometimes to their being open to the rain, their contents are commonly wet and offensive. In some instances the middens have been connected with the drains with a view to carrying off the water from them, an expedient open to very grave objections. . . . There is a great want of better arrangement for the removal of the contents of privies and ashpits. The Sanitary Authority do not undertake the work, and it is left to occupiers, who are dependent upon farmers for this service. The night-soil is not much valued as manure, owing to the large admixture of ashes and useless material, which it contains. A small sum has often to be paid for its removal, and there is great difficulty in getting it taken away at all at those seasons of the year when the farmers' men and carts are otherwise employed. At the time of my visit, which was one when it might be supposed that less difficulty in this respect would be met with, large accumulations of ashes and night-soil were the rule rather than the exception, many middens were over-full, and great heaps of ashes were littered all around them. A further danger to health arises from the circumstance that, owing to the difficulty of getting rid of the night-soil, the occupiers are often led to dispose of it on their garden plots, near the houses and wells. An examination of the soil in the gardens often showed it to be largely composed of ashes, and in more than one instance I saw heaps of night-soil, which had been removed from the privies, standing in the gardens within a few feet of the well."

In regard to the general subject of the position of the wells, we read further on,—

"The drinking water supplied in Coalville is derived exclusively from private wells, there being no public service. The wells are of moderate depth, and are usually fitted with pumps, one pump serving for a block of buildings. Some properties, however, are without water fit for drinking, and the tenants have to fetch water whence they can, unless, as is sometimes done, the landlord pays an acknowledgment for the use of the pump on a neighbouring property. . . . The upper part of the wells is rarely made watertight, so as to be secured against the entrance of surface impurities, and of many the water is muddy after rain. The well has usually drains in its neighbourhood; a common position for the pump, as already mentioned, being opposite the entry, where the drains from the whole block of houses converge to pass through the entry into the street sewer; and if these drains be leaky, the well water is exposed to contamination from them. . . . The wells in Coalville must therefore be looked upon as being at all times more or less exposed to serious risk of dangerous pollution, and of many of them the water is admittedly unfit to drink. It is evident that a public service of wholesome water from an outside source is greatly needed at Coalville, but consideration of this matter, like others, has awaited the settlement of the Local Board question."

Is it surprising that Dr. Parsons should have had to report on "the prevalence of enteric fever and diphtheria" in a neighbourhood thus circumstanced?

THE Decimal Association cannot fail to have been gratified and encouraged,—and, perhaps, agreeably surprised,—at the attitude of the Trades Union Congress towards their question. The following resolution was passed,—apparently without any dissent:—"That, in the opinion of this Congress, it is highly desirable, in the interests of the working classes and of the general trade of the country, that the decimal system of weights, measures, and coinage shall be adopted as a national system; and that the Parliamentary Committee be instructed to promote legisla-

tion on this question." The latter part of the resolution is characteristic of the Labour Parliament, where they "take the bull by the horns," and where questions are not approached first and then cautiously brought step by step to practical issues; and contrasts somewhat oddly with the resolutions of such bodies as Chambers of Commerce, who have declared their conviction of the great desirability of this reform long before the trade unions recognised it as being of any importance whatever. The resolution adopted by the Associated Chambers of Commerce on March 26, 1890, reads, "That, having regard to the strong opinion held by this Association as to the desirability of introducing into this country the decimal system of coinage, weights, and measures, this Association is of opinion that the most practical course to adopt in order to assure the ultimate attainment of what is generally agreed to be so desirable in the interests of commerce, is to commence the study of the decimal system in all public elementary schools." The delay in grappling with this question is undoubtedly to be ascribed to apprehension on the part of the legislature as to the magnitude of the obstacles which must be met with in passing from the one system to the other; for the Select Committee which investigated the subject unhesitatingly declared that "No unnecessary delay should prevent the full introduction of the decimal system." It is from the working classes that the principal opposition to the change has been anticipated; and here we have them boldly instructing their representatives to "promote legislation" upon a subject which successive administrations have been afraid to touch.

THE unfortunate omnibus accident in Piccadilly has proved that omnibuses as at present built may be turned over if the horses fall, improbable as such an event must appear. We have not seen any reliable statement as to how the vehicle was situated at the moment of the accident, but we should expect to find that it was more or less askew on the roadway, turning to avoid something else, and therefore somewhat across the incline of Piccadilly at that part. Had it been heading straight down the incline we can hardly see any reason for the upset. The accident however enforces the point, to which attention has been drawn before in our columns (and to which a correspondent, "F.R.C.S." calls attention in Wednesday's *Times*), that the incline of that part of Piccadilly, considering the crowded traffic there, is a distinct source of danger, aggravated by two circumstances, the often slippery state of the wood pavement, and the rate of driving down the incline frequently indulged in. "F.R.C.S." renews the suggestion that the incline should be lessened by raising the hollow part of Piccadilly, and there is no doubt this could easily be done as far as the roadway is concerned. It must be remembered however that as matters now stand it is almost impossible to raise the footway, owing to the levels of the ground-floor entrances of some (not all) of the houses; and the appearance of the footway in a hole, as it were, would be very unsightly in such a street, and very considerable compensation would have to be paid for what would certainly constitute an injury to the valuable house property there. We do not say that these objections ought not to be put aside in order to make the roadway safer for such a large traffic; we only point out that they exist and cannot be overlooked.

IN his usual four-weekly report on the sanitary condition of Kensington the Medical Officer of Health, Dr. Orme Ludfield, commenting on the recent scare about glanders, makes some practical and certainly not uncalled-for remarks in regard to the manner in which both the development of this disease in horses, and its occasional communication to human beings, is connected with the construction and arrangement of the

* Published by Eyre & Spottiswoode.

buildings occupied by horses and those employed about them. We quote Dr. Dudfield's words:—

"Glanders may, probably, be generated *de novo* by insanitary conditions, and, if it is so, will never be got rid of until more attention than customary is paid to the sanitation of stables. And why should not as much care be bestowed,—by operation of law if necessary,—upon the inspection of stables, as in the case of co-houses? More air-space, light, ventilation, and better drainage arrangements are required in these places. It will hardly be questioned that it would 'pay,' in every way, to treat horses better than is commonly done, in respect of their home accommodation, especially having regard to the fact that insanitary conditions in stables, by reducing the resisting power of the animal, render him more liable to attack by disease, both of an ordinary kind, and specific, like glanders and farcy. But apart from this, it must be remembered that many thousands of persons in the metropolis necessarily live in contact with horses, in rooms over stables, and it cannot be doubted that disease and death are not seldom the result of malaria, due to the insanitary conditions of stables, as in the case to which I have already alluded, where two of our parishioners came to a horrible end from glanders, which there was every reason to believe was due, not to contact with the diseased animals, but to infection conveyed by a polluted atmosphere."

In regard to the horses, we have over and over again urged that ventilation to stables should receive more attention than it does, and that in the majority of cases it is so defective that human beings exposed to the same conditions in regard to ventilation would never be expected to keep in good health; and yet it is expected that horses (more delicate creatures, in some respects, than men) should be healthy under these conditions. The method of construction of rooms situated over stables (which in a London mews it seems impossible from considerations of space to avoid), is also a matter of the greatest importance. They should be completely isolated from all air-contact with the stables, and always separated from the latter by a floor of concrete or other impervious material.

IN no long time the Great Western Railway Company will have extended their line in the London section, and will have also increased the size of several of their stations. At Maidenhead and Taplow work is being vigorously prosecuted, and the facilities for what may also be called suburban traffic on this line will be much improved. It is very strange, however, that the building of a new station at Reading is not taken in hand. Public attention has been more than once directed to the danger to the traffic by reason of up and down trains having to be brought to the same line of platform. Apart from this, the elongated shed which is dignified by the name of a station is inconvenient and altogether unworthy of an important town such as Reading, and one which is the centre of a district. No time should be lost not only in erecting a new station, but in making arrangements for its use by the South-Western Company, so that passengers from one line to the other should not have to use two different stations. It is sometimes said that railway companies know their own business best, but every day shows that even the best managed companies constantly require pressure from the public in order to keep them up to the mark.

IT is to be hoped that the decision of Mr. Hopkins in the case of the complaint of Miss Armiger against the South-west and Vauxhall Water Company will afford a useful lesson to water companies in regard to their frequently high-handed and most insanitary procedure in the cutting off of water-supply. It appears that Miss Armiger received her supply from a pipe which also supplied the adjoining premises, and that the adjoining owner had applied to have constant service put on at his house, and the water had been cut off while this was being done. Miss Armiger accordingly found her water-supply unexpectedly cut off, and complained to the company, who allowed a week to elapse before seeing into the

matter. The magistrate said that the company's defence was one "with no sort of justification," and imposed a penalty of 10*l.* for the neglect, coupled with a compensation penalty of 1*l.* a day for the eight days during which the complainant was left without water after giving the company notice. That water companies should have the power to cut off a necessary of life and of the sanitary condition of a house even for the enforcement of payment is a condition which is open to the strongest objection in the general interests of the community; but that they should fail for a week to investigate a complaint of want of water from a customer against whom they appear to have had no claim for default of payment is scandalous, and it is to be hoped that next time any water company neglects its duty in this manner a much more substantial fine will be imposed.

IN the programme of the competition for designs for a new market-hall for Budapest (mentioned in our foreign intelligence of this week), there are two points that deserve the attention of promoters of competitions in England. The first is: "any special idea or feature shown in a design set in but not premiated is not to be made use of by the promoters of the competition without the special permission of the author"; and the second is that "every competitor will receive a good reproduction of the drawings of the design which the jury considers most suitable." The competition seems to be very well arranged, the fact of having fifteen first-class assessors being exceptional, even on the Continent, where the number seldom exceeds seven.

A CHICAGO paper, *The Economist* (not to be confounded with the English journal of the same name), gives a rejoicing description of a new building to be erected in that city, in which the only visible material in front will be plate-glass divided out by aluminium mullions. This is supposed to be the latest and purest external expression of the characteristic method of steel-frame building popular in Chicago and other modern cities of the States, in which the real construction is a steel framing which is built up independently of the outer walls, the latter being only the architectural face. The aluminium facing to the framing is of course equally a mere skin treatment, but it has the effect of giving to what is really a metal construction the appearance of metal. That is what "business architecture" in the new country seems to be tending to. The Chicago paper thinks the structure "will make its mark in the world as new, original, and beautiful." We may admit the first two adjectives, but not the last. Such structures may be practical and economical, but the building has ceased to be architecture, in any sense in which that expression has hitherto been understood in the world.

THE SANITARY APPLIANCES EXHIBITION AT PORTSMOUTH.

THE usual Exhibition in connexion with the Sanitary Congress is being held in the New Drill-hall, and will remain open after the close of the Congress, until October 8. An endeavour is being wisely made to attract the general public, who can hardly be induced to take much notice of the regular Congress work, to visit the Exhibition by the bait of promenade concerts, model dairy and practical demonstrations, as well as lectures on cookery. Thus, whilst being amused, some additional knowledge of hygiene and sanitation may be imbibed by the general public. The model dairy has been fitted up by the North Wiltshire Dairy Company, of Portsmouth, with cream separators, churns, butter-worker, and Devonshire cream-maker; and the cows being also on the premises, visitors will be able to see in action the whole process of dairy work as illustrated by Miss Hall. The building is lighted by electric light from a dynamo driven by an Otto gas-engine, and exhibited by Messrs. Crompton

& Co., who also contribute a number of cooking utensils heated by electric current, the utility of which is practically demonstrated by Mrs. W. H. Knight in her lectures on hygienic cookery, and compared with the operations of gas-stove and oil-stove cookery. The electric cooking utensils are, as our readers will readily understand, made on the principle of constructing the metal surfaces of pots and pans with wires of high resistance imbedded and enamelled to the surface, and this application of electricity suggests many great possibilities in the future.

We are pleased to notice that the Exhibition was practically complete at the time of opening, a desideratum which is not always obtained in the case of exhibitions. This desirable result was no doubt partly due to the regulation that all exhibits were to be in position before the judging commenced, some three days before the opening. We may here mention that the judges for this year are:—Mr. Ernest Turner, F.R.I.B.A., chairman; Mr. R. W. Peregrine Birch, M.Inst. O.E.; Professor A. Wynter Blyth, M.R.C.S.; Professor W. H. Corfield, M.A., M.D. Oxon, F.R.C.P.; Mr. Thos. W. Cutler, F.R.I.B.A.; Mr. Rogers Field, B.A., M.Inst. C.E.; Mr. Baldwin Latham, M.Inst. C.E.; Mr. Henry Law, M.Inst. C.E.; Dr. A. News-holme, M.D., D.P.H.; and Dr. Louis Parkes, M.D., D.P.H.

The exhibits have been classified in four divisions, viz.:

Division A, Science in relation to Hygiene.
B, Hygiene of Special Classes, Trades, and Professions.
C, Construction and Sanitary Apparatus, which is subdivided into the following three classes:—

1. Building Materials, Construction, and Machinery.
2. Water Supply and Sewerage.
3. Heating, Lighting, and Ventilating.

While the fourth division, D, is devoted to Personal and Domestic Hygiene. These main divisions are sub-divided into numerous sections, and, indeed, we may say that we find, as on former occasions, that the classification of the Exhibition is rather more elaborate than the contributions.

The exhibits with which we are principally concerned are naturally those in division C, but it is perhaps more convenient for our readers to follow the numerical arrangement of the stalls rather than the classification.

Stall No. 2 contains an excellent collection of exhibits by Messrs. Wm. Sugg & Co., Ltd., the well-known gas engineers of Westminster, who show a large number of their many appliances for gas-cooking, of which the "Confectioner" and the "Robert's" Griller are amongst the novelties; the former intended, as its name implies, for the use of confectioners, and the latter for restaurants. Messrs. Sugg have also taken advantage of the locality of the Exhibition to show their ventilators for torpedo vessels, which are a special application of the Sugg & Co. Simeance patent "Continuous Up-draught" Ventilator, which is probably familiar to most of our readers. A good feature shown in one of the gas kitchens is an oven with glass doors intended to obviate the necessity, or rather the tendency, of ordinary household cooks to constantly open the oven door to see how the cooking is going on and thereby losing heat.

The importance of really effective filters justifies the large Stall, No. 3, occupied by the Berkefeld Filter Company, of Mark-lane, who show numerous filters which seem to have been particularly successful in the thorough filtration of microbes.

At Stall No. 7, Messrs. Hughes & Lancaster, of London, exhibit a "Shoove Hydro-Pneumatic Ejector," and a good and well-arranged show of various classes of sanitary fittings and plumbers' work is exhibited by the Portsmouth Water Fittings Company (Stall No. 12), and contains many well-known and approved types of apparatus, thus assisting in the educational part of the Exhibition.

Messrs. J. Tyler & Sons, London, have a very good show of specialities of their manufacture at Stall No. 14. Amongst the novelties are the "Weir" tip-up lavatory, arranged to shoot its contents direct into the waste-pipe, instead of into a retainer, as in the older forms of tip-up basins. The "Column" pedestal closet (which has before been described in these columns) is now improved by being made with a solid back. The "Pedestal" valve closet is a new introduction, and is a particularly neat and satisfactory combination, possessing the advantages

of both the valve and pedestal forms. The "Turret" closet is also a speciality, having the advantage of being raised from the floor, and capable of being fixed without being in close proximity to the wall.

In Stall 15 the well-known "Blackman" fan is exhibited, including one of those working by an electric motor contained in the construction of the fan itself.

At Stall 16 we have a show-case of "Carbolic" disinfectants, exhibited by Mr. H. Ellison, of Cleckheaton, and, what is more interesting, an ingenious Automatic Disinfecter for supplying small quantities of liquid disinfectant to flushing cisterns.

Messrs. Droad & Co. have a large collection of their drainage specialities at Stall 17, including their well-known white enamelled channel bends and traps for inspection and interceptor chambers. They also show some gratings of so-called rustless ironwork, but we fear that this long-sought-for article has not yet been found, as close inspection reveals on the specimens submitted some small signs of rust. There can be no doubt that the best of the processes now employed for preserving iron from rust require the very greatest care in their application to obtain good results.

Messrs. Doulton & Co., at Stall 20, have restricted themselves to a small exhibit of filters and water-softening apparatus.

Mr. C. G. Roberts, of Haslemere, at Stall 21, shows specimens of his rain-water separators, one with glass front to illustrate the working of these ingenious and useful adjuncts to a country house.

At Stall 22, The Rainbow Engineering Co., of London, show by plans and models of parts the system devised by Mr. C. H. Rosher, C.E., for heating the water of swimming-baths, which has been used very successfully in several cases, and particularly during the last winter at "Venice in London," to the complete satisfaction of Mr. Imre Kiralfy. The "Rosher" system consists generally of a forced circulation of the water by means of a "circulating heater," (or a "circulating pump," in connexion with a heater), so arranged as to draw the water from the bath at suitable points, and re-deliver it at or near the bottom of the bath at other suitable points. As a rule, the circulator is arranged to draw from the bottom of the bath, and also from overflow level as required, and the water is re-delivered through "spreaders," placed practically flush with the bath floor. Leaving the spreaders at a high velocity under pressure, the incoming water is distributed over the bath floor in the form of a thin layer or film, and, whether for the purposes of heating by convection or for agitation, the whole area of the bath is affected. Arrangements can be made for the filtration of the water at each withdrawal of the water, this system admits of great economy in the working of swimming-baths, whilst the temperature of the whole body of water is remarkably even, and there is no chance of bathers being scalded by the introduction of live steam or highly-heated water.

Monie's well-known earth closets are shown by the Monie's Patent Earth Closet Company of London (Stall 24).

Mr. H. Sally, of Nottingham, at Stall 26, exhibits some Noiseless Safety Pavement and Floor Lights, which closely resemble those of Messrs. Hayward Bros. & Eckstein, except that slips of teak are inserted in the iron frames between the lenses, whereby the "noiseless" character is obtained.

Messrs. C. E. Gittins, of London, have at Stall 29 some filters which possess distinct advantages, in that they are easily cleaned and recharged, whilst the taps are wholly of stoneware, with the exception of an india-rubber washer that does not come in contact with the direct flow of water. These taps being made in screw form by machinery are interchangeable, and thus particularly suitable for export trade. The same firm also exhibit their water-softening apparatus.

Messrs. T. Smith & Co., of London, show (Stall 31) a large collection of specimens of their manufactures of glazed stoneware for sanitary purposes, which are interesting, but not novel.

At Stall 41, Messrs. A. H. Ford & E. G. Wright, of Portsmouth, exhibit their scheme for the ventilation of sewers by the use of a separate pipe at the top of the sewer, and parallel with it, through which fresh air is supposed to travel, drawing with it the foul air of the sewer. With the aid of a jet, or other means of inducing a

current, it seems that this system has some advantages.

The plumbers appear to be devoting most of their attention at present to two minor details: silent flushing cisterns and connexions of stoneware and lead pipes; and at Stall 42 we find Mr. E. Ward, of Clapham, with two flushing cisterns, "The Premier" and "The Warden," which have fairly solved the problem of noiseless action, and are besides well made and skillfully constructed.

At Stall 43, Mr. A. Angell, of the County Laboratory, Southampton, exhibits specimens of cement, made from sewage sludge and gas-lime, for which it is claimed that the utilisation of these two waste products would enable a corporation dealing with the sewage and gas supply of a town of 50,000 inhabitants to manufacture 5 tons of cement a day at a profit of 15s. a ton. It is not contended that the cement produced is equal to the best Portland cement, as the tensional strength is not equal to the best records, while uniformity in quality is decidedly lacking. The same exhibitor also shows his "Calortene" boiler coating, which has been employed at Portsmouth Dockyard with satisfactory results, and appears to save some 70 per cent. of the heat in boilers and steam-pipes.

Messrs. Quirk & Sharp, of Liverpool (Stall 44) have one of the joints for stoneware and lead pipes, to which we have referred, consisting of a split ring and rubber washer, which is a satisfactory arrangement.

At Stall 47, the Trott Patent Valve and Engineering Company, of Battersea, have some excellent examples of their valves, which are well and strongly made, and consist of a sliding or swinging valve in a chamber covered with a screwed cap, or nozzle, the unscrewing of which facilitates the removal of the inner valve and the insertion of new asbestos or metal discs when necessary. The waste interlocking bath valves are particularly worth notice, and are so arranged that the waste valve cannot be opened without closing the inlet valves, thus preventing waste of water, whilst only one handle is required for controlling the hot, cold, or tepid water-supply and waste. Thus these valves are especially suitable for use in asylums and other public institutions.

Messrs. D. T. Bostel & Son, of London, at Stall 48, have besides their "Excelsior" closets and "Silent" flushing cisterns, some good forms of joint for connecting lead pipes to stoneware.

The next stall, No. 49, occupied by Mr. John Jones, of Sydney-street, Chelsea, is particularly interesting to the professional visitor by reason of the collection of various instruments for use in testing drains. The hag stopper, which is of proved utility for plugging drains of irregular shape and awkward form, is improved in detail. Then we have an expanding screw stopper, of which the special point is the provision of a hollow rubber ring instead of the usual solid ring, thus giving a much greater range of expansion. These stoppers can be obtained with indicator gauges attached, which greatly facilitate the testing of the tightness and also the fall of a drain. The most notable of the devices exhibited in this department is, however, the automatic pump for forcing smoke into drains and pipes, which by the use of clockwork obviates the necessity of keeping a man constantly at work as in most of the machines for the application of the smoke test. Mr. Jones has improved the form of his manhole cover, in which the inner cover is arched to utilise the condensation of water vapour for a seal, by providing another groove to form a second seal. We may here note that all the newest forms of manhole cover aim at the provision of a double seal in various ways, and this particular one appears to do so in as satisfactory a manner as any. For deep manholes the cover is made in two parts connected by chains, so that any drain air may be kept at a low level instead of filling the manhole. We have at this stall also an improved mica flap inlet in which the flaps are hung at the side instead of at the top, in order to obviate some of the disadvantages to which these inlets are subject.

Mr. E. R. Palmer, of Backenham, has, at Stall 50, a good exhibit of large size automatic flushing apparatus for drains and sewers, made in sizes up to 36 in. diameter, which are admirable for their purpose.

Mr. Milton Syer, of Peckham (Stall 51), has amongst other of his manufactures, a new flushing cistern, the "Eldolon," which has the double advantage of being noiseless, and also disinfecting,—each discharge of water carry-

ing a quantity of powerful disinfectant with it.

At Stall 52, the well-known manufacturer, Mr. George Jennings, of Lambeth, has a good display of some of his specialities in lavatories, improved bath-fittings, and closets.

The Water Carriage Engineering Company, of Mowbray-street, Sheffield, have at Stall 56, an exhibit of one of the best forms of trough-closet we have seen, together with a strong and simple automatic flush tank, both of which are eminently suited for rough usage.

Stall 62 is occupied by Messrs. Wheeler & Sons, of Notting Hill-gate, with their automatic ventilators fitted with cones inside the wind blades, which were noted in the *Builder* a short time back (vol. lxi, p. 451).

At the next Stall (63), Messrs. C. Kite & Co., of London and Glasgow, have a large exhibit of their self-acting ventilators, and other appliances which are amongst the best of their class.

We now come to a group of exhibits in the Heating and Lighting Class, in which we may first notice Stall 65, where Messrs. John Wright & Co., of London and Birmingham, have a good show of gas-stoves for both warming and cooking.

At Stall 66, James Stott & Co., of Fleet-street, exhibit their well-tried gas regulators, and the Stott-Thorp Reflex Sunlight, a large gas light of the regenerative type.

Stall 67 is occupied by the Gwinn Cae Colliery Company, of Rotherham, with specimens of anthracite coal, stoves suitable for the burning of which are shown at Stall 68, by Messrs. E. A. Cleaves & Co., of Great St. Helen's, London, and at Stall 69, by the London Warming and Ventilating Company, of Great Winchester-street. The difficulty of burning anthracite is, in each case, overcome by the employment of back draught or "Revertive" action.

The Eagle Range and Foundry Co., of Birmingham, have, at Stall 71, a very good show of "Eagle" ranges and fire grates, of varying sizes, while at Stall 74, Mr. H. Heim, of London, has examples of the "Helios" and "Hestra" grates and stoves.

One of the most interesting exhibits in the heating section is that of the Economic Smokelss Fire Co., of London, who, at Stall 78, have some excellent kitcheners, arranged for burning the poorest class of fuel, and, at the same time, consuming smoke by drawing off the products of combustion at the bottom and back of the fire-grate.

Still continuing the numerical order of the catalogue, we note, at Stall 85, a well-built medical broncham, by Messrs. Linton Brothers, of Portsmouth, which finds its chief claim to a place in a Health Exhibition by the provision of ventilation, a very desirable feature in the confined cubical space of a carriage interior.

At the next stall, No. 86, Messrs. J. J. Thornton & Co., of Southsea and Brighton, have a collection of india-rubber goods, a class of article which, for wearing apparel, is to be avoided rather than adopted by seekers for health.

At Stall 87, the Bilton Company, of London, exhibit their hygienic tobacco-pipe, one of the latest of the never-ending attempts to prevent the fouling of these articles.

Stall 94 is occupied by the Rizine Food Co., who seem to be able to justly claim a place amongst hygienic exhibits for the advantages of their commodity, as illustrated in Mrs. Wright's cookery demonstrations.

Coming to Stall 102, we get back to the heating section, for here the Parkhouse Iron Company, of High Holborn, have some good specimens of kitchen ranges, of which the chief recommendation is their combination of the double functions of close kitcheners and open ranges. In the next stall (103), Messrs. H. Darwin & Co., of London and Glasgow, have a good series of gas-cooking apparatus, from the smallest holling-stoves, price one shilling, upwards. Their cooker is noteworthy for its fire-brick top, and the careful arrangement of boiling-jets to prevent the extinction of the flame by the holling over of liquids.

Messrs. R. & A. Main, of London and Glasgow, show, at Stall 104, some of their many forms of gas cooking apparatus and models of some of the larger examples of their work for restaurants and other large kitchens, of which the firm make a speciality. We may mention that the gas cooking stoves and hotplates for oat-cakes used by Mrs. Wright in her demonstrations are supplied by Messrs. Main.

School Board Cooker, 30 in. high over all, is specially designed for use by children in cookery centres, and arrangements have been made for practical demonstration by some of the Board School children of the town of its suitability for the purpose.

At Stall III the excellent disinfecting apparatus of Mr. Washington Lyon, of Peckham, is illustrated. By this apparatus clothes and other articles are disinfected by dry steam without injury to the most delicate fabrics and without unpleasant smells, while the disinfection is thorough and the apparatus is durable and economical in working.

A special microscope room has been arranged in which a loan collection of bacteriological specimens and various forms of microscope illustrate the use of this instrument in modern sanitary work.

In the grounds outside the Drill-hall Messrs. Humphreys have erected a galvanised iron building, in which the Royal Portsmouth and Gosport Hospital illustrate the working of a small hospital, even to the extent of providing a patient and nurse.

Also, in the grounds, the method of forming and using a military camp kitchen is demonstrated; while here also are the bulky exhibits of Messrs. W. Clements, Abell, & Co., of Worcester, who show chain pumps, water and dust carts, and street-sweeping machines.

AWARDS AT THE SANITARY INSTITUTE CONGRESS.

The following awards of medals and certificates have been for objects exhibited at the Sanitary Exhibition in connexion with the Congress at Portsmouth. We give only those awards which are for inventions or articles within the class of subjects that are of direct interest to our readers:—

DIVISION B.—Hygiene of Special Classes, Trades, and Professions.—*Certificates:* C. Groom: a Square Tent for Garden. Humphreys, Limited: Iron Temporary Hospital Hut. Portsmouth Water Fittings Co.: Water Curtain for Public Places of Entertainment.

DIVISION C.—Water Supply and Sewerage, Class 2.—*Medals:* Broad & Co.: Enamelled Fireclay Water Cisterns. *Certificates:* Portsmouth Water Fittings Co.: Shauks' Enamelled Iron Bath; Shanks' Independent Spray and Plunge Bath. Broad & Co.: White Enamelled Fireclay Sink; White Enamelled Straight and Curved Channels for Inspection Chambers to Drains. The Trott Valve and Engineering Co.: Removable Valves for Hot and Cold Water Cocks; Combined Bath Valve, with Interlocking Gear for Waste. Geo. Jennings: Cabinet Lavatory Stand. Milne, Sons, & Macfie: Brass Syphon Traps. Coteman & Morton: Improved Tumbler Sanitary Cart. Water Carriage Engineering Co.: Flush Indicator. W. Clements, Abell, & Co.: Balanced Water Cart. Milne, Sons, & Macfie: Standing Waste and Overflow, with Trapping Bend for Bath. Water Carriage Engineering Co.: Automatic Flushing Syphon, with Tipping Bucket at Outlet. E. R. Palmer: Palmer's Automatic Flushing Syphon.

DIVISION C.—Heating, Lighting, and Ventilation, Class 3.—*Medals:* J. Greenall: Greenall's Steam Washer. *Certificates:* Eagle Range and Foundry Co.: No. 35 Eagle Regulator for Regulating Draught to Eagle Open Fire-grate; Indicating Damper to Eagle Range. S. S. Way: Terra-cotta Door and Window Jamb.

DIVISION D.—Personal and Domestic Hygiene.—*Medals:* Washington Lyon: Steam Disinfecter. Norris Tube Ammunition Co.: Morris Circulating Principle of Water Filtration. *Certificates:* Berkeley Filter Co.: The Berkeley Filter. Jeye's Sanitary Co.: Jeye's Fluid. C. E. Gittins, Limited: Porcelain Screw Tap for Filter.

The judges desire to refer to the specimens displayed on the walls of the Exhibition of the record plans of the sewerage and house drainage of the Borough of Portsmouth, and to congratulate the Town Council on the way in which these plans have been kept up, and on the possession of such a valuable record, not only of the sewerage, but of the details of some thousands of house drains.

(Signed) ERNEST TURNER, F.R.I.B.A.,
Chairman.

E. WHITE WALLIS, F.S.S.,
Secretary.

THE SANITARY CONGRESS.

THE thirteenth Congress of the Sanitary Institute commenced on Monday last at Portsmouth very successfully. The chief Magistrates of Southampton and Chichester, as well as the Mayor of Portsmouth, the Bishop of Chichester, the Bishop of Portsmouth, and all the local magistrates, with the Duke of Cornwall at their head, have either lent their names or are taking a personal part in the Congress.

The proceedings of the opening day included a formal reception of the members of the Congress at the fine Town-hall which the town has acquired; a luncheon of which some 150 congressists partook; the inaugural address of the new President, Sir Charles A. Cameron, the famous Irish sanitarian; and, lastly, the opening ceremony at the Volunteer Drill-hall by the Lord Mayor in State. At the luncheon the Lord Mayor presided, supported by the Mayor of Southampton, Mr. James Lemon, C.E., F.R.I.B.A., &c.; Alderman Sir Wm. King; Sir Thomas Crawford, the retiring President; Sir Charles Cameron, the President elect, and an influential local committee. The Mayor (Alderman T. Scott Foster), after the loyal toast, proposed "Success to the Congress," and extended a hearty welcome to Portsmouth to all the members present, ladies not less than gentlemen. Portsmouth, he believed, was ahead of many of the largest towns in the country in sanitary matters. A great deal of money had been spent on drainage and other sanitary improvements in the town, but he was glad to say that the improvement in the health of the community had given an ample return. Sir Thos. Crawford replied to the toast, expressing a confident hope that the Congress of Portsmouth would be no less successful than that at Brighton two years ago had been, and if that hope were realised, the Sanitary Institute would have every reason to be satisfied. After the toast of "The Mayor and Mayores" had been proposed by Sir Charles Cameron, and responded to by the Chief Magistrate, the company adjourned to the Grand Jury Room, where the new President delivered his inaugural address, of which we give the principal portion, dealing with the subject of

THE VICTORIAN ERA, THE AGE OF SANITATION.

"From the earliest ages, since the people of these islands emerged from barbarism, some attention was given to the subject of public health, and a few enactments, more or less relating to the health of the people, may be found on the Parliamentary statute books and amongst the edicts of the sovereigns previous to the nineteenth century. Their provisions were, however, rarely enforced, and if all the Sanitary Acts passed before Her Majesty's reign were collected, they would form a volume of no great size. Let us see what the Victorian age of sanitary legislation and literature has produced.

The first important official report in reference to the health of the people was issued in 1842, under the title of 'Report of the Sanitary Condition of the Labouring Population of Great Britain;' it was soon followed by legislative action. A Factory Act was passed in 1844, and this was the first of the many general statutes more or less relating to the public health enacted during her Majesty's reign. In 1845 a Nuisances Removal Act was passed, and in 1848 the well-known Nuisances Removal and Diseases Prevention Act was put on the Statute Book. In 1866 a useful 'Sanitary Act' came into operation, and in 1872 was followed by a Public Health Act. The Common Lodging Houses Act of 1851 was the first that dealt specifically with the dwellings of the poorer classes of the community. These six Acts of Parliament have all been amended and extended,—some of them a great many times,—and they and the amending Acts constitute perhaps the most comprehensive code of sanitary laws ever enacted in either ancient or modern times. In addition to these Sanitary Acts, other important ones have been passed in relation to burial-grounds, mines, town parks, and open spaces, the adulteration of food and drugs, the diseases of animals used as food, the sale of milk, margarine, and poisons, the pollution of water, trade nuisances, the construction and management of bake-houses, the storage of explosives and petroleum. Numerous private Acts of Parliament, obtained by local authorities, are either altogether sanitary or contain clauses relating to sanitation.

Numerous as are the volumes of sanitary laws, they are exceeded by those containing the evidence in relation to sanitary matters given before Parliamentary Committees, Royal Commissions, and 'Departmental' Committees, together with the reports thereon. These Blue Books constitute an immense library, in which voluminous details are given in relation to the dwellings, occupations, food, water supplies, diseases, and medical relief of man; and to the hygiene and municipal administration of towns. The Blue Books issued from the Medical Department of the Local Government Board and the Army and Navy Medical Departments are numerous and valuable.

A third department of sanitary literature consists of the annual and special reports of the Medical Officers of Health, which may be numbered by thousands. They are the annals of sanitary progress. Until very recently they dealt only with the health of towns; but in the future we may expect valuable reports on purely rural districts from the County Medical Officers of Health. Until now nothing worth boasting of has been done to improve the status of health in the open country; but the last Local Government Act has created for the rural districts sanitary organisations similar to those which have long existed in towns. We might venture to hope that under the new régime of County Councils, the well-known rural death-rate of 17 per 1,000 may be reduced to 16 or less.

Not so numerous as the reports of Medical Officers of Health, but not less interesting, are the Transactions and Journals of the Sanitary Institute and similar organisations. The Journal of the Statistical Society is rich in sanitary literature. The Transactions and Journals of medical sanitary societies and of the Public Health Sections of medical associations contain numerous contributions to hygienic literature.

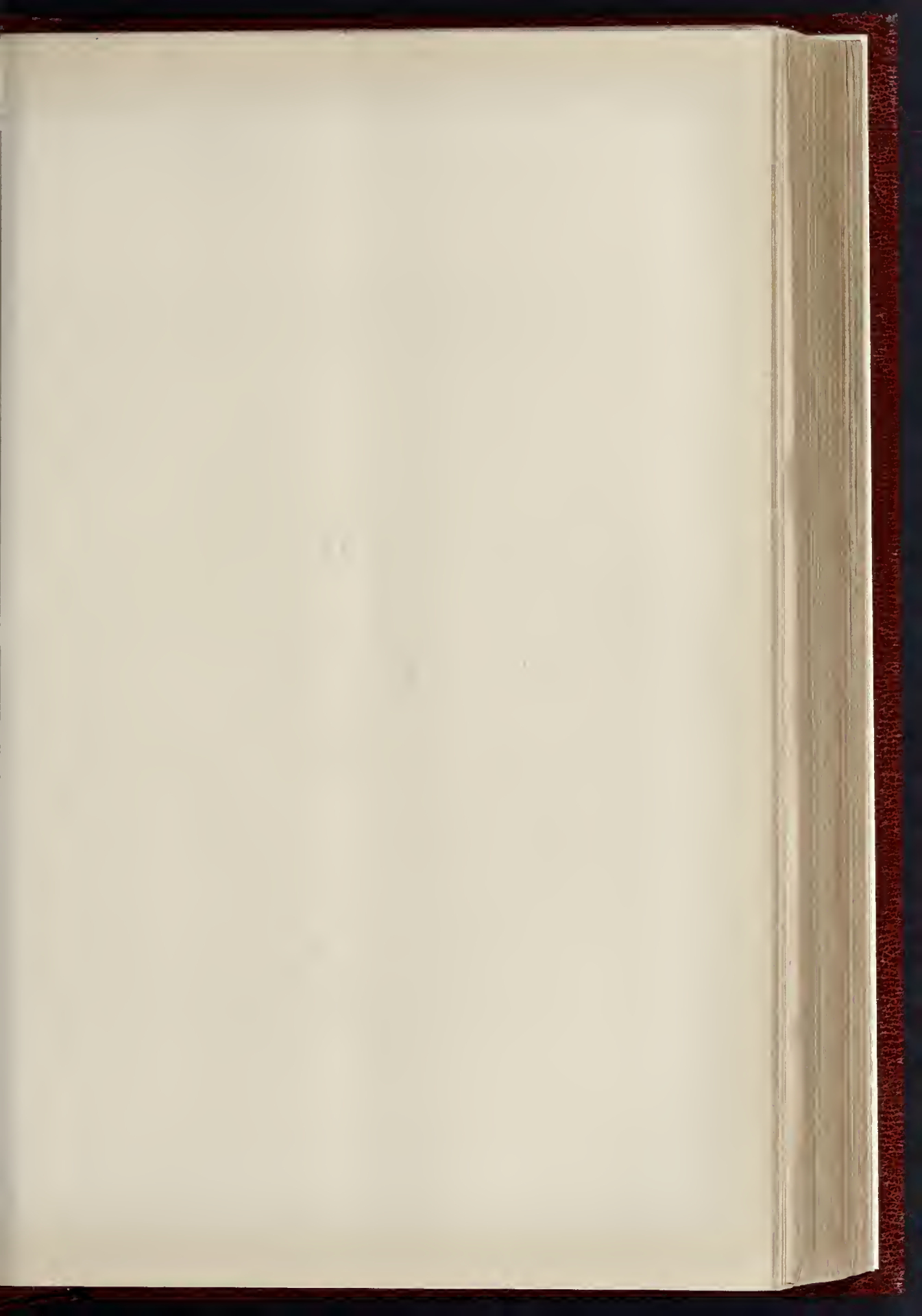
Public health has its representatives amongst the periodicals of the day; for example, the *Sanitary Record*, *Hygiene*, the *Health Record*, &c. It has also special departments assigned to it in most of the purely medical journals. In May of the present year a welcome addition to the shape of the *Journal of Pathology and Bacteriology*, in which, judging by the names of intending contributors on its title-page, we may expect some brilliant writing on the causation and prophylaxis of microbial diseases.

Prior to the Victorian age there was only one really comprehensive and philosophical book on Hygiene published in Great Britain; this was the 'Philosophy of Health,' by Dr. Southwood Smith, which appeared in 1838, and which still may be read with advantage. For some years past dozens of books, more or less relating to public or private hygiene, issue annually from the Press; many of them of large size, as for example, the ponderous book by Stevenson and Murphy, issued in the present year, and which, though only the first volume of a treatise, numbers 1,018 large pages.

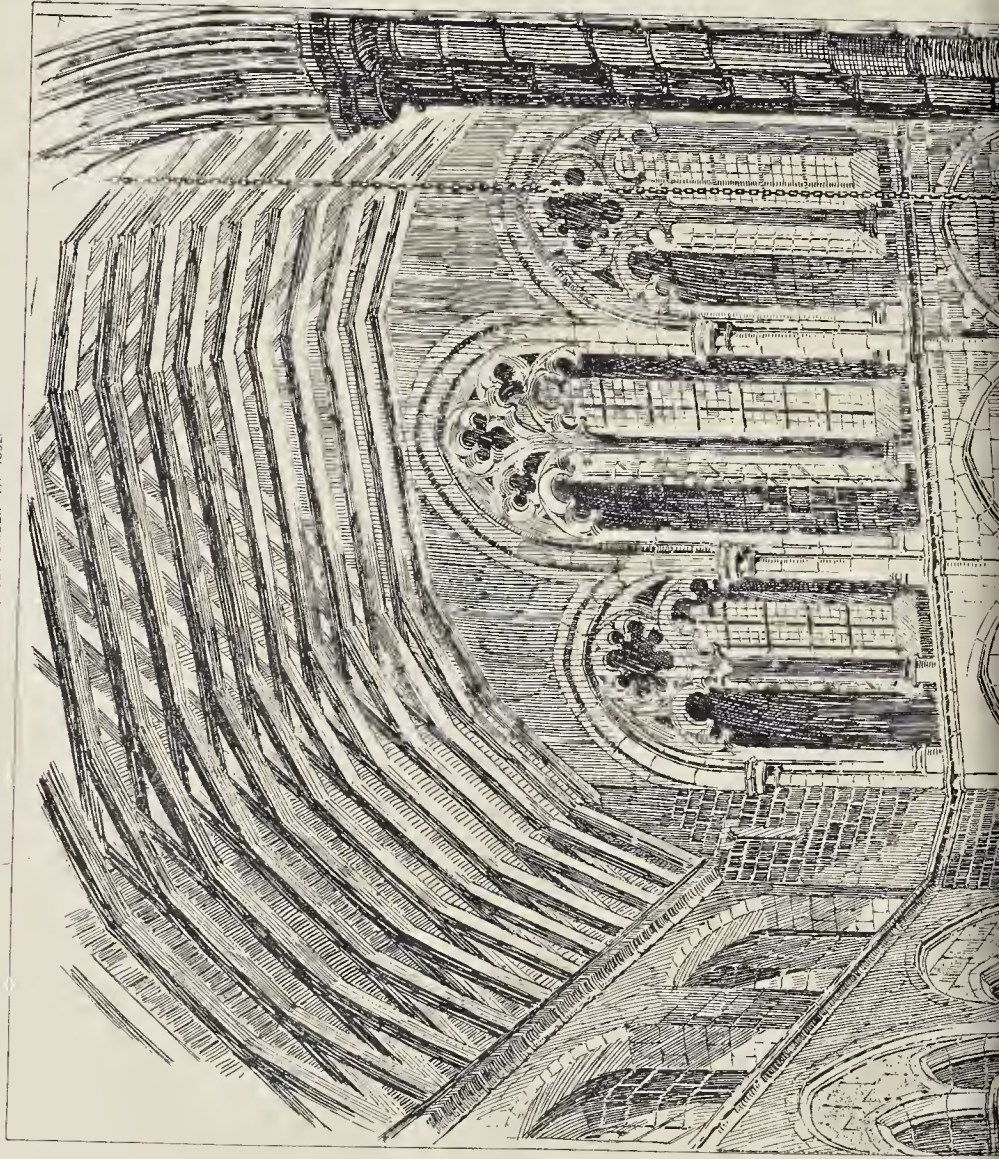
There is no more convincing evidence that this is the age of sanitation than the fact that the books on the subject published within the Victorian era would furnish a large library, whilst those of an older date would hardly garnish a single bookshelf.

The higher estimation of preventive medicine, which lately prevails amongst the professors of the healing art, is shown by the recent institution of degrees, diplomas and certificates in Public Health, State Medicine, and Sanitary Science by the universities and medical and surgical corporations. I am proud, as a citizen of Dublin, to be able to state that the university of that city was the first to create a diploma in state medicine. This was in the year 1865. Its example has been followed by all the other medical licensing bodies, and there are now some hundreds of holders of sanitary qualifications. I may also be permitted to say in this connexion that the Professorship of Hygiene, which I hold in the Royal College of Surgeons, Ireland, was the first instituted in Europe, with, I believe, one exception, namely, that in the Medical School of Montpellier. The Chair of 'Hygiene or Political Medicine' of the Irish College of Surgeons was established in 1844.

Quite recently some of the medical licensing bodies have decided to require of candidates for their ordinary diplomas evidence of study in sanitary science; and for the Public Health Diplomas it must be shown that the candidates have worked in a chemical sanitary laboratory.



THE BUILDER, SEPTEMBER 17, 1892.



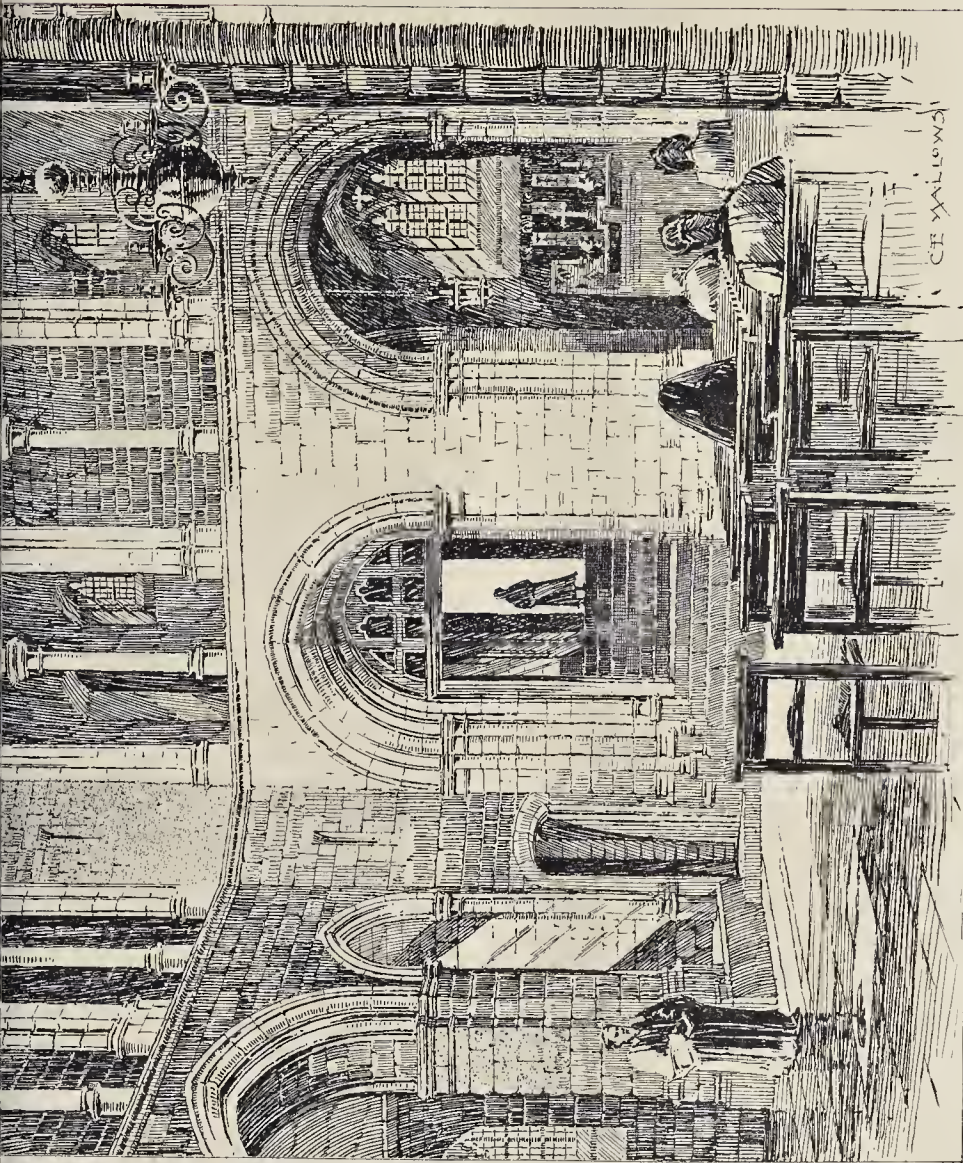


PHOTO LITHO. SPRINGUE & CO. 482 EAST HADING STREET, FETTER LANE, E.C.

THE NEW NORTH TRANSEPT: ST BARTHOLOMEW THE GREAT, SMITHFIELD.—MR ASTON WEBB, F.R.I.B.A., ARCHITECT

Lloyd Academy Exhibition, 1892.

d have studied the duties of a health officer under a Medical Officer of Health. It is a good sign of the times to find that the Medical Act of 1887 made Public Health Diplomats registrable qualifications.

In the future no one will be eligible to act as Medical Officer of Health for a town of 50,000 inhabitants and upwards unless he holds a registrable qualification in public health.

Before the Victorian era there were few sanitary laws worth administering, and consequently no *raison d'être* for local boards of health. Some drainage works were carried out by the town and country authorities, and a few attempts were made to improve the water supplies of urban districts. The filth produced in towns had to be got rid of in some way; on the other hand people were taught to be too economical in the consumption of fuel by the imposition of a rate on hearths, and they were encouraged to exclude daylight by having to pay a window-tax.

The insanitary state of British towns was made painfully evident by the invasion of cholera in 1831. According to official statistics 60 died from cholera in 1831-2, 31,376 persons in England and Wales, and 21,171 in Ireland. In 1848 cholera re-appeared in England and Wales, and destroyed 53,273 lives. In 1853, 1,097 deaths were ascribed to cholera, of which about one-half occurred in London. In 1866 it re-appeared, but with less fatal results. The deaths in England attributed to it were 1,378, in Ireland 2,501, and in Scotland 1,470; total 5,349. This lessened mortality was not due to the milder character of the disease, but rather to the towns being less filthy than they were during previous visitations. On the Continent so virulent and widespread was cholera at this time that it is computed it caused more than one million of deaths. In Italy alone it carried off 120,000 victims; and in the small countries of Holland and Belgium it caused 10,000 deaths.

When cholera first appeared in Dublin in 1831, the sanitary state of the city was deplorable, and consequently 5,632 out of a population of a quarter of a million perished. When it came again to Dublin in 1849, the condition of the city was not so bad, and the victims to cholera were only 1,664. In 1866 Dublin was for the third time visited by cholera, and on this occasion 923 deaths were caused by it.

Sanitary matters were in 1866 better than in 1849; and were the disease again to invade Dublin, I venture to hope that it would be much less fatal than in 1866. I think that in British towns generally Asiatic cholera will not again cause such ravages as it did in 1831, 1848, 1854, and 1866. I am not very apprehensive that the epidemic which now rages on the Continent of Europe,—in which it has appeared seventeen times since 1829,—will extend to our islands.

It was probably the ravages caused by cholera in 1831-2, and more especially in 1849, that first awakened the public to the necessity of improving the hygienic conditions of towns. A committee appointed to inquire into the sanitary condition of the Metropolis reported in 1848 that no substantial improvement had taken place in the state of the back streets, lanes, alleys, and courts since the cholera epidemic of 1831-2. The committee expressed an opinion that if the disease were again to visit London, it would spread as extensively and prove as fatal as it did in the former visitation. This prediction was, unfortunately, but too soon verified; but in the meantime the era of sanitary activity was initiated by the passing of the Public Health Act of 1848. This Act, though it permitted and did not compel sanitary reforms, was a useful one, and was availed of to some extent, as was also the case with the Local Government Act of 1858.

An important agency in promoting sanitary legislation were the valuable reports,—issued in 1842 and 1845,—of the Commission on the Health of Towns.

The powers conferred upon health authorities, at first almost invariably permissive, gradually became more of a mandatory character. What a difference, is there not, in the significance of these two words 'shall' or 'may' in a sanitary statute! The exercise of the powers vested in local authorities has resulted in the expenditure of an enormous sum of money. It has mainly been employed in securing pure water supplies, to construct drains, to pave streets, to thin out densely inhabited places, to clear unhealthy areas, in erect dwellings of a healthful kind for the working classes, to provide public abattoirs, baths

and washhouses, town parks and open spaces, to build and maintain fever hospitals, to adopt improved methods of filth disposal. The maintenance of staffs of sanitary officers has caused a large addition to the taxation of towns. Formerly very few towns were provided with even a single Inspector of Nuisances. In 1864 Dublin had but one sanitary officer, now it has nearly fifty. It must be admitted that the administration of the sanitary laws involves a substantial outlay of money. It is, however, money well expended. It gives a good return in the form of a lessened sickness rate and reduced mortality. It diminishes pauperism, by preserving the health of the working man. The death of the labourer by a preventable disease may have the effect of sending his children into the workhouse. Sanitation has greatly reduced the mortality caused by preventable diseases. We pay enormous sums for an Army and Navy to preserve us from foreign foes, to protect our liberty, property, and lives. But there are foes our brave sailors and soldiers cannot defend us from; enemies that kill annually far more than ever fell upon the battlefields during our greatest wars. These enemies are the infective diseases, which are not necessarily concomitants of human nature, and the attacks of which may be, and some day shall be, warded off. We require an army of sanitarians to guard us against those deadly foes. They who vanquish them achieve victories far more glorious than ever warrior won. They are triumphs which are not followed by the groans of the wounded, the wail of the widow, or the cry of the orphan. The trophies of the conquest are increased health, life, and wealth to man.

As the soldier to be effective must be skilfully trained to the use of arms, and grounded in the knowledge of tactics and strategy, so should the sanitarian be thoroughly instructed in the principles of hygienic science, and capable of using the necessary instruments of research. It is not long since every medical man was considered perfectly competent to act as an officer of health, but now the model medical officer of health is expected to know more than the ordinary practitioner. He is expected to be familiar with the use of meteorological instruments, to have some knowledge of geology, to understand sufficient engineering as to know how sewers and drains should be constructed, trapped, and ventilated. He may be called upon to suggest how the noxious effluvia from certain factories may be rendered innocuous. He is often requested to pronounce as to the fitness or unfitness of the flesh of animals as food for man, and he cannot do that properly if unacquainted with the diseases of those animals. Not infrequently he acts as an analyst, and examines potable water, determines the amount of carbonic acid in the air of places suspected of being unhealthy, and does other sanitary-chemical work. As yet he has not been called upon to do much as a bacteriologist, but in the immediate future the candidate medical officer of health will be expected to have a thorough knowledge of the pathogenic microbes; to be able to determine the number of micro-organisms per cubic centimetre of water, and to be an adept in the 'cultivation' of bacteria, bacilli, spirilla, *et hoc genus omne*.

The Medical Officer of Health will be something more than a physician and surgeon—he will, in a sufficient degree, be a bacteriologist, chemist, a veterinarian, a geologist, an engineer, a statistician, and, so far as the sanitary statutes are concerned, a lawyer. Already several Medical Officers of Health have taken the barrister's degree.

Until quite recently there were no special arrangements made in the medical schools for teaching sanitary science; but this defect is being remedied, especially as regards the sanitary analysis of air and water, and the chemical and microscopical examination of food and drugs. Courses of lectures on hygiene and State medicine are also delivered, but at present not in all the medical schools. On the Continent bacteriological laboratories have been established in nearly all the universities and seats of medical education, and in the great Pasteur Institute at Paris the methods of identifying and 'cultivating' microbes may be studied. In these countries there is no great institution altogether devoted to researches into the intimate nature of those organisms, invisible to the unassisted eye, apparently almost without structure, yet endowed with a virulent potentiality rivalling that of strychnine or

prussic acid. How marvellous, is it not, that we discover upon the contents of the visible world the causes of some of the most fatal diseases of man and of his subjects in creation.

There are few natural phenomena more wonderful than the enormous dynamic effect produced upon organised matter by these microscopic objects. A few, perhaps even one, of them introduced into the body of the largest animal may quickly raise its temperature and deprave its vital functions, disorganising the whole living mass, which exceeds in dimension its enemy by countless billions. Shakespeare, whose genius was prophetic as well as sublime, anticipated the modern description of infective matter when he spoke of it as that

Whose effect
Holds such an enmity with blood of man
That, swift as quicksilver, it courses through
The natural gates and alleys of the body,
And with a sudden vigour it doth posset
And curd, like eager droppings into milk,
The thin and wholesome blood.

Some provision for the study and teaching of bacteriology has been made by Cambridge University, the Colleges of Physicians and Surgeons, London and Edinburgh, the College of State Medicine, the Brown Institute, and, but to no great extent, in a few other places. We have no place which can be compared to the Pasteur Institute in Paris; it is the largest and best equipped bacteriological laboratory in the world. The British Institute of Preventive Medicine, established in 1890, proposes to found a bacteriological laboratory and accessories, on a scale equivalent to that of the Pasteur Institute. For this purpose it asks the rich and generous British public to subscribe 100,000*l.* Some handsome donations, including one of 2,000*l.* from Mr. Mond, have resulted from this appeal; and let us hope that British philanthropy, to which we are indebted for many noble gifts to the nation, will endow an institution, the objects of which are eminently for the benefit of man.

Hardly less important than the Medical Officers of Health and the Medical Inspectors of the Local Government Board are the rank and file of our sanitary army,—the Inspectors, or rather *discoverers*, of Nuisances. Formerly anyone was considered competent to do the work of the Sanitary Inspector, and persons who had been failures in other walks of life were often provided for by appointing them to be Nuisance Inspectors. This happily is now as a rule an exploded practice. It is realised that the person who has to discover sanitary defects in dwellings, public institutions, factories, schools, and other places should have some acquaintance with the laws of health. The Sanitary Institute never did a better thing than the institution of their certificates for Inspectors of Nuisances, and also for Local Surveyors. Since 1877 no fewer than 1,312 candidates for the sanitary certificate have been examined, of whom 825, or 63 per cent., were successful. During the same period 78 local surveyors received certificates, and 113 were unsuccessful.

During the Victorian age many millions of money have been spent in the execution of sanitary works, and in the maintenance of a legion of sanitary officers. Have the results of this vast expenditure of money and human labour been such as to satisfy us that it has not been a waste of our pecuniary resources and our time? Do they encourage us to further outlay and increased exertions? I think both queries may be answered affirmatively. That money spent to improve the sanitary condition of places has not always been judiciously laid out is quite true, but the same may be said of expenditure for most other public purposes. It must, moreover, be admitted that the provisions of many of the Acts relating to health have not been fully carried out, and that many local sanitary authorities, especially in rural districts, have lamentably failed to perform the duties, whether permissive or mandatory, entrusted to them by Parliament. It would not be difficult to discover places where the sanitary statutes are almost or wholly dead letters. They would indeed be dead letters in more places than they are were it not for the powerful influence exercised upon public opinion and on the conduct of the authorities by such organisations as the Sanitary Institute, and by the pen and voice of earnest sanitarians. There are hundreds of towns and villages in these islands which are still unprovided with proper

arrangements for drainage and filth disposal, and which are dependent upon scanty supplies of water, often of bad or inferior quality. On the whole, however, it must be admitted that the sanitary powers confided to the local authorities have been largely put in force. Let us see what good has resulted therefrom.

I do not propose to institute, except in the briefest manner, comparisons between the England of to-day and the England of a century or two ago. From 1700 to 1750 the death-rate in London was so high that population stagnated. In the former year the inhabitants numbered 665,200, and in the latter year 653,900. During this period the deaths were in the ratio of about 1 per 30 persons living. By 1801, the population had crept up to 777,000 and the deaths had fallen to 1 in 41 persons living. This great improvement in the state of public health in London was not, except in a trifling extent, the result of sanitary legislation. People were becoming more enlightened on many matters affecting their health, partly owing to a more general knowledge of chemistry, physiology, and other sciences relating to man and his surroundings. When those entrusted with the conduct of public affairs became aware how much the health of people was affected by bad water, by foul emanations from cesspools, and by too great a density of population, they began to secure supplies of pure water, to construct proper house-drains and street and house sewers, to remove systematically filth from houses, and to widen streets. The promulgation of the natural laws of health preceded the enactment of laws of health by the State. Jenner's discovery of prophylaxis in small-pox had for its corollary the vaccination laws. The chemical analysis of water was the basis of Acts of Parliament relating to water and rivers.

Until about forty years ago common-sense was the only motive power which impelled sanitary reforms in London and elsewhere. It was not imperative, for early in this century the grosser defects in public and private hygiene had been recognised, and, to a great extent, remedied.

In Rickman's Report to Parliament on the Census of 1811, he gives the following estimates of the death-rates in England:—

In 1780.....	1 death per 40 persons living.
„ 1790.....	1 „ 45 „
„ 1800.....	1 „ 47 „
„ 1810.....	1 „ 49 or 50 „

If these estimates are reliable, it would seem that after the great improvement in the public health in the latter part of the eighteenth and early portion of the nineteenth century no sensible change for better or worse took place for about half a century. According to Rickman, the death-rate in 1810 would be about 20 or 21 per 1,000 persons living.

In Dr. Newsholme's excellent work on "Vital Statistics" he gives the death-rate for males in the period 1838-1853 as 23.28 per 1,000 males living, and the rate for females at 21.65. It would therefore appear that the mortality of the population had increased as the century grew older. Probably the earlier statistics, collected before the Act for the registration of births, deaths, and marriages, were not quite accurate; no doubt some deaths escaped record. It would, however, seem that from 1810 to 1854,—making some allowance for defective registration,—there was no reduction in the death-rate. Even if we take the period 1851-60 we find no improvement: the deaths were in the ratio of 22.25. In 1861-70 the rate was 22.5, or 0.25 more than in the previous decade. It must, however, be borne in mind that from the beginning of the century population was increasing rapidly in the towns,—which must always, at their best, be less healthy than the country,—whilst in the rural districts population remained stationary or declined. It was therefore something to boast of, that although the towns of England were increasing in population at the rate of from 200,000 to 300,000 annually, the death-rate of the whole country had not sensibly increased.

In 1872 a Public Health Act was passed, which was amended and improved in 1875. This Act has been one of the most valuable ever passed, and to its operation must be reasonably attributed the improvement of the public health during the last two decades.

During the ten years ended in 1850 the mean annual death-rate in the Metropolis was 24.8 per 1,000 persons living; in 1851-60 the rate was 23.4, and in 1861-70 it was 24.1. During

these thirty years there was no marked improvement in the sanitary state of London. Now comes the epoch of sanitary activity: in the period of 1871-80 the death-rate fell to 22.5, and in the decade ended in 1890 it further declined to 20.5, or 4.3 below the rate for the period 1841-50. If the death-rate in Greater London had been as high during the years 1881-90 as in the period 1841-50 nearly 50,000 more deaths would have taken place.

Early in the century the provincial towns were with few exceptions more insanitary than London. In reading the local literature of these places one often comes across descriptions of the abodes of human beings which are almost incredible, and which happily would now apply to very few English towns. In a pamphlet entitled "Religion and Crime," by Mr. John M. Morgan, and published by Longmans, London, in 1832, a dreadful description of Bristol is given. The author states that 566 families occupied each only part of a room, and that 2,224 families lived each in a single apartment. In a report upon the sanitary state of Nottingham, in 1839, by Mr. Falkener, it is stated that there were between 7,000 and 8,000 houses in that town placed back to back, without any through ventilation and unprovided with the proper appliances of civilised life. It is not surprising that in Nottingham 99,017 cases of fever occurred in the years 1835-6 and 7; but it is surprising to find that notwithstanding the acknowledged unhealthiness of back-to-back houses nearly 10,000 of them still exist in Manchester; need we then wonder that the mortality of the inhabitants of that great city exceeds that of every other of the great towns of England?

Mean annual death-rate in England and Wales:—

Period.	Males.	Females.	Total.
1841-70.....	23.3	21.5	22.4
1871-75.....	23.3	20.7	22.0
1876-80.....	22.1	19.5	20.8
1881-85.....	20.5	18.3	19.4
1886-90.....	20.0	17.8	18.9
1891.....	21.5	19.0	20.2

In 1851-60 the death-rate in large towns was 24.7, and in the country 19.9. In 1888-91 the rate in the towns was 20.4, and in the country 17.5.

The year 1891 was an unhealthy year, as will now and then be the case; but even in that year the mortality was much below that of the period 1841-70. If it were equal to the mean rate for that period there would have been 63,749 more deaths during the year.

The low death-rate in England is all the more remarkable when we consider the very large proportion of the population located in towns. In 1892, 18,931,070 persons lived in towns and 10,472,276 in the country; total, 29,403,346.

Whilst the death-rate of London has been declining the population of the great City has been increasing and concentrating. In 1841 the density of its population was moderate, *i.e.*, 25 persons per acre; but in 1891 there were 56.5 persons per acre. Large and dense populations are, as a rule, more unhealthy than small and widely-scattered ones. In London the unfavourable influence of the closer approximation of its inhabitants is much more than compensated for by the great improvements effected in the general hygienic conditions of the City.

The address was listened to with marked attention and was much applauded. At its close Alderman Sir William King proposed a vote of thanks, and Mr. Lemon (Mayor of Southampton) seconded it, the latter expressing a firm conviction, with regard to the apprehensions of a cholera epidemic, that England has less to fear from it than any other country in the world.

Sectional Meetings.

The sectional meetings commenced on Tuesday at 10.30, divided as follows:—I. Naval and Military Hygiene, presided over by Inspector-General J. D. Macdonald, M.D., &c., &c.; II. Medical Officer of Health, presided over by Dr. Chas. Kelly, M.R.C.P., at the offices of the Gas Company; III. Municipal and County Engineers, presided over by Mr. H. Percy Boulnois, M.Inst.C.E., at the Water Company's offices; IV. The Sanitary Inspectors, presided over by Prof. A. Wynter Blyth, at Victoria Hall; and V. Domestic Hygiene, presided over by Lady Douglas Galton, at the Town-hall, where in the evening a lecture was delivered by Sir Thomas Crawford, on "English Homes."

Municipal and County Engineers.

The President of this section, Mr. H. P. Boulnois, who was formerly Broughton Engineer of Portsmouth, in opening the proceedings, expressed great satisfaction at finding himself present at a Sanitary Congress held in that important and prosperous borough, where so many years of his private and professional life had been spent. It was the first time in the history of the Sanitary Institute that a Conference of that kind had been held, and he trusted the new departure would be fraught with good results. During the reign of Queen Victoria each successive Parliament seemed to have emulated its predecessor in passing Acts to confer extended powers on the local governing bodies with a view to meet the sanitary requirements of the nation. That increase of powers had undoubtedly necessitated the educational advancement of the executive officers of these authorities, and he ventured to believe that amongst these officers the advancement of the Municipal and County Engineers in professional knowledge and skill had fully kept pace with the times. "The recent visit to this country of that terrible scourge, cholera, had shown the value of the sanitary work which had been undertaken, and the vigilance, skill, and unwearied zeal of those brother officials, the Medical Officer of Health and the Sanitary Inspector. Although the cholera had been amongst us, it had been unable to take root. Good water, efficient sewerage, proper scavenging, plenty of air and light had been too much for it, and such a disease could never again be an epidemic in this country, thanks to our sanitary works and precautions. Much progress had been realised in the past, but there still remained much to be accomplished.

The principal subject brought forward after the address was "Town Refuse and Refuse Destructors," by Mr. C. Jones, M.Inst.C.E. (Balling), but a brief paper on "Street Gullies and Road Cleansing" was also read for Mr. W. B. G. Bennett, M.Inst.C.E. (Southampton). The growth of towns, the progress of sanitary science, and the vigilance of Sanitary Authorities, said Mr. Jones, rendered it more difficult and much more costly to get rid of refuse than formerly, and the difficulty was felt in foreign capitals, like Paris, equally with our own metropolis. The day was, happily, past when refuse could be dumped down into the nearest hole or on the site of some new street or new building, and health considerations forbade its open passage for long distances through populous streets. The contents of the dust-bin being so largely composed of combustible material, the cremation of refuse would naturally occur to the mind, but it is less than a score of years since a suitable crematory was devised. In 1876 Nottingham made trial of Fryer's Destructor with encouraging results, and three destructors of this type were built. The paper referred to the improved types of cremators since brought out and described, particularly the construction of the "Perfectus" of Mr. Warner, the "Destructor" of Mr. Whitley (Manchester), and that of Mr. H. P. Boulnois, the President of that Conference. In all, the principle was the same, the refuse to be destroyed being conveyed by various methods to the top of a tube or chamber, there to be tipped on a declining surface, from which it found its way into the furnace. After refuse has been some time exposed to great heat, not less than from 1,000 to 1,500 deg. Fahr., three-quarters of its weight has been dispersed, and the residuum was a hard clinker and fine ashes, about one-quarter the original weight of the refuse. The noxious elements were driven off, with no deleterious effects, when a Fume Cremator was used with the older type of destructor. A material not only inoffensive but useful was left, and in the process enormous heat, capable of generating vast sources of power, was developed, which if utilised must greatly reduce the cost of this method of disposing of refuse. With the "Fume Cremator," a chamber placed between the furnace and the chimney-shaft, the sludge of roads and even sewage sludge could be got rid of without the slightest nuisance being caused, because everything was instantly decomposed by the gases which, perforce, pass through the cremator chamber. In the best types of "destructors" the heat was turned into power. At Southampton, pumping machinery is worked, electricity is generated, and dynamos (for the electric light) are driven; and it was just this utilization of heat to pro-

dance power that most fascinated the speaker at the Conference on Tuesday. The 2,500,000 tons of sewage produced annually in London would have made an immense reduction in the bngco coal bill incurred at the Outfall Works, Crossness and Barking, had they been utilised in a destructor. The total cost of the process, including repayment of capital, &c., was computed at 3s. 6d. per ton treated.

In the discussion which followed, in which the President, Messrs. Mawbey (Leicester), Boulton (Burslem), Weaver (Kensington), and other members took part, the reduction of cost by the utilisation of the heat was the principal point under consideration, and many valuable suggestions were thrown out. A cordial vote of thanks was accorded to Mr. Jones for the paper.

The Sanitary Inspectors' Conference.

A numerously-attended Conference was held in the Victoria Hall, at which Professor A. Wynter Blyth, who presided, delivered the following address in opening the proceedings:—

The Sanitary Institute has at length attained its proper position. It is confessedly the chief society in the kingdom having for its main object the furtherance of all knowledge relating to the prevention of disease; it watches over and promotes health legislation; it encourages and rewards invention, by its Museum, by its Exhibitions, and by its Congresses; but, according to my idea, its chief claim for continued and prosperous existence is its great services in hygienic education. The Institute is the first body which ever organised permanently educational lectures with the express purpose of giving the necessary technical knowledge to Inspectors. These educational courses have not been confined to the metropolis, but have been established in nearly all the great population centres, and most of the County Councils have been induced to set aside a portion of the Education Grant for that purpose; nor have the advantages been confined to Inspectors. In each instance a fair number of the general public has attended. The results of this general diffusion of accurate knowledge on the prevention of disease are incalculable, for the fact cannot be too widely accepted, that sanitary laws that are in advance of the average mental culture of the people are so many dead letters. In Russia, in Turkey, in Spain, and many other parts, it would be quite possible to enact laws superior to our own with regard to the prevention of disease, but the sanitary condition of the countries would not be improved, to a great extent, for hygiene begins in the household; it must be imparted by parent to child; its precepts must be lisped at the mother's knee; and piped in infant school; then, and then only, will the sanitary officers of any country get the hearty co-operation of the people. The Institute was also the first body to give practical embodiment to the idea that candidates for the post of Inspector should be tested by examination; it is at present the only body the certificate of which is recognised by the Local Government Board. It is a matter of general knowledge that other examining bodies are in existence; as yet they have not received official sanction, and whether they will receive it I know not; but from the history of the medical profession this fact can be learned—that it is not to the interest of Inspectors to multiply examining boards. There are some thirty or forty bodies which are capable of granting a legal qualification to practise medicine in the three kingdoms; the result is that a young medical man thinks he is bound to multiply his degrees; he is not satisfied with the qualification of the physicians and surgeons, but considers that the more letters he has after his name, the better the chance of practice or of appointments. He passes a great portion of the best years of his life in studying for examinations, and spends no small portion of his substance, the end result being neither to the advantage of himself nor to that of the community. The only class of persons which are benefited is the class of professional examiners. Speaking as one of the class of examiners, it is to my personal interest to promote and foster the multiplying of all examining boards; but speaking as one of the class of Sanitary Inspectors for each health officer by virtue of his office is a Sanitary Inspector, I declare no less emphatically that this multiplication is against the best interests of the Sanitary Inspectors. How the medical student sighs for the one portal system, and how the

medical profession as a whole has endeavoured, and endeavoured in vain, to evolve one examining body from the chaos of qualifying bodies, is to be read in the medical history of the last ten years.

Should the Inspectors sacrifice their interests to satisfy the restless ambition of a few discontented spirits, it is easy to forecast the result. Within a little time there will be some dozen examining bodies, and the ambitious Inspector will not be satisfied with the certificate of one of them, but he will, like the young medical man, take two or three, this being a mere question of money. The certificates themselves will be unequal in value, some, as in the analogous case of medical degrees, will be of high value, others of low value; but neither the public nor the local authorities will appreciate these differences. A man holding a certificate of the lower kind will be equal in their eyes, so far as qualification goes, to the certificated man who passed through the examination of the stricter. Besides which the multiplication of examining bodies has of itself a tendency to increase the number of certificated men; and the greater the number of certificated men the greater the competition for appointments and the greater the competition, other things being equal, the lower the salary. The progressive stiffening of the Institute's examination has had the good effect of greatly diminishing the number of applicants for an advertised berth. In the old days every clerk, planter, builder, and out-of-work loafer would answer an advertisement, but the condition enforced by the majority of local authorities that a man must have the certificate of the Institute, has altered all this. Now the local authority, thanks to the Institute, has only to select the man whom they think most suitable from a comparatively-speaking small and select body. Having been placed by virtue of a qualifying examination on a similar basis to that of the pharmaceutical chemist, the modern Sanitary Inspector has a definite position to maintain; in his hands to a great extent lies the future of the public health service, and therefore I will next make a few observations on the subject of "conduct." In the sense I am using the term "conduct," it is almost synonymous with "manners." Conduct is distinct from ability, and from even morality. Talent is an endowment of both, which may be cultivated, but never acquired. Good or bad morals are also, to a larger extent than teachers of religion will allow, engrained and built into the system; the possession of ancestors the majority of whom have been good and virtuous, healthy minds, and healthy bodies, is a gift of value unsurpassed. But good manners are capable of being acquired by all, and a man is judged by those with whom he comes into casual contact in the daily routine of duty, almost entirely by his courtesy or otherwise. Whether the large powers of entry into the Englishman's castle, and the powers of interference with personal liberty of the subject which by those in the conduct of Inspectors individually and collectively. Power can only be safely given to those who prove themselves fit to exercise it. Of all nations the English are most tenacious of the principle of the privacy, even the sanctity, of the home, and this principle is outraged if an official enters without knocking, without permission, and with hat-covered head. Let a home be a room with dirt-begrimed windows, tenanted with squalor and misery, the furniture a broken chair, the bed a heap of rags, yet I advise Inspectors as a matter of policy to sue due ceremony on entering, such as they would on entering the threshold of the clean and wealthy. Emerson took his hat off to a flower as the emblem of heauty, and an outward sign of homage may well be given, not out of respect to the rags or the squalor, but as a recognition of the principle of home sanctity. The propriety of a silent tread and soft voice in the presence of sickness or sorrow is too obvious to need more than mention. Speech is silver, silence is gold says the proverb, so it is only exceptional that an Inspector requires to harangue sinners against statute or by-law. His duty begins with observation, it ends with report. Censure, where there should be commendation, abuse from owners, temptation from those who would sell bad material or work with a bribe, and, worse than all, false accusation, are troubles some or all of which the Inspector is likely to encounter, and demand the exercise of the utmost patience, the utmost self-control.

A man's temper is not always self-governable, but self-control by continual exercise can be certainly improved. In a dispute it must be remembered that the man who preserves has an advantage over the man who has lost his temper, similar to the advantage of a sober over a drunken man. If the soft answer that turns away wrath prevails not, take refuge in silence, for it takes two to quarrel. The Inspector's qualities are only tried by "accusation." I regret to remark that the majority of local authorities have shown themselves incapable of making just inquiry into charges against officers. Whenever a local authority has to investigate a charge so serious that it may involve loss of character or office, the authority is practically a court of justice, and should never forget the elementary principles of justice,—viz. that the charge should be definite, not general and indefinite; that the accused should have a copy in writing of the charge; that he should be present during the whole time that witnesses for or against him are examined; that he should have an opportunity of cross-examining the witnesses, and ample facility for preparing his defence. So little have these principles been followed, that it has happened more than once that a local authority, actually in the absence of the officer, has investigated a charge, considered it proved without hearing the other side, and passed a vote of censure.

[Continued on p. 228.]

Illustrations.

DESIGN FOR FRIEZE; "AMORES CAPRARII."

THIS is a reduced lithograph from the large drawing by Mr. John S. Bahr for a frieze, which formed a conspicuous object at one end of the architectural room of the Royal Academy this year. The artist writes:—

"My idea as regards the design of youthful figures, 'Amores Caprarii,' was that it should form one of a series of panels, with analogous subjects ('Amores Pastores,' &c.), for the frieze of a large hall or room, treated in the colour shown in the original drawing.

I have wished to make it thoroughly architectural in character, using the plain ground for the figures, as I think the modern tendency to regular picture treatment is unsatisfactory in association with architecture.

The distance from the eye at which a frieze is necessarily placed makes the plain ground the only one, especially in a climate like ours, which reveals the designs sufficiently; and it affords the fullest scope to an artist's sense of grace or form.

This drawing should have been executed, had it suited me to do so, to at least twice its present scale—viz., 14 ft. long, instead of 7 ft., for the actual place it occupied when exhibited.

The actual frieze would, perhaps, be best executed in Gambier Barry's spirit fresco; but, for economy, oil on canvas, with gum elements flattening might be used; a method the stability of which, however, is perhaps questionable."

ST. BARTHOLOMEW-THE-GREAT, E.C.

THE new transepts we illustrate this week will practically complete, with the exception of the Lady-chapel, the work of restoration of this church commenced by the Rev. W. Abbiss in 1866 under the direction of Professor T. Hayter Lewis and Mr. Slater, and continued by the Rev. W. Panckridge and the present rector, the Rev. B. Savory. The original transepts were both destroyed by fire—that on the south side being still in existence in the early part of the present century; the new transepts, therefore, cause no disturbance to the old work, but by providing abutments to the central arches add to their stability, and have merely involved the removal of modern walls hurriedly built to keep out the weather after the destruction of the original transepts. These were considerably deeper than the present ones, but to have rebuilt them on the old lines would have involved the purchase at great cost of neighbouring properties, and as additional space is not required they would have only added to the present heavy cost of heating and maintenance. The plan shows the arrangement of these transepts; that on the south was completed and opened last year, that on the north is in

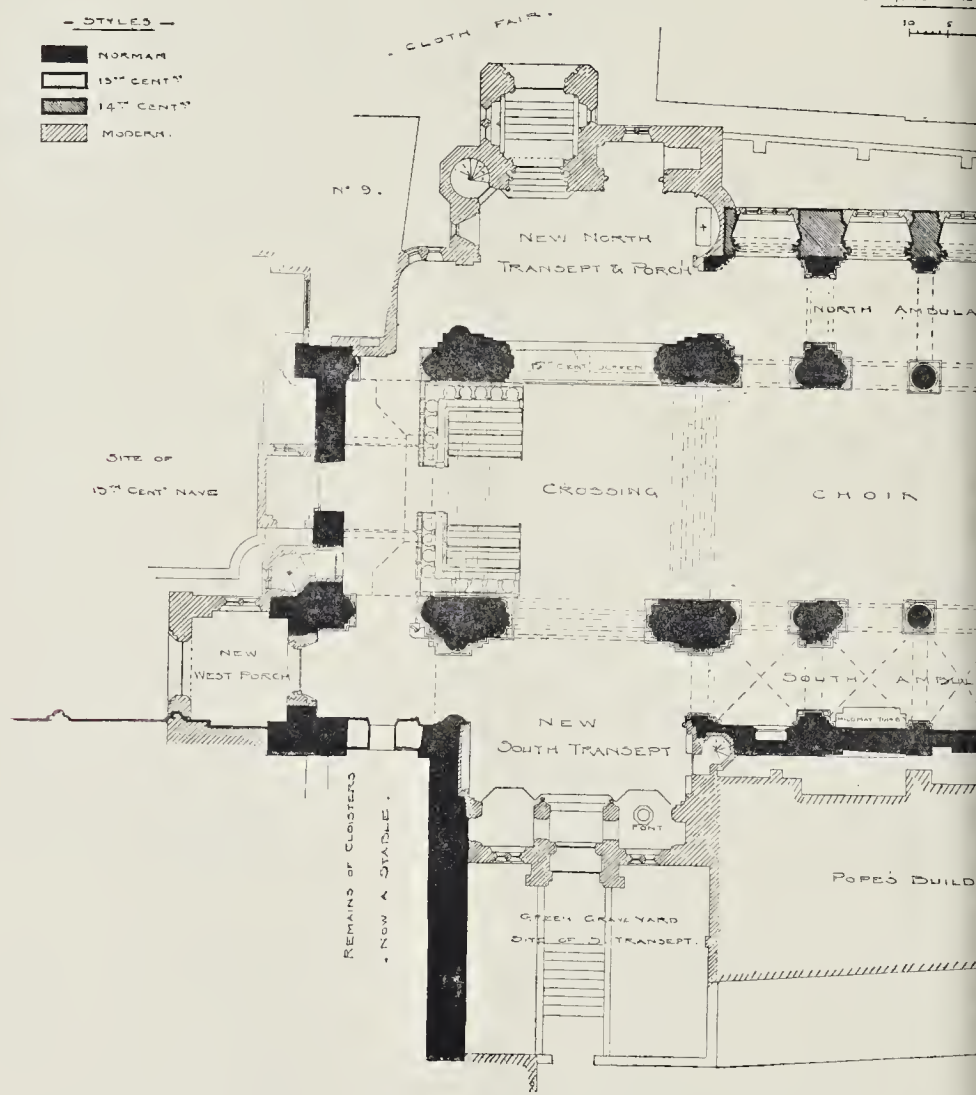
- CHURCH OF ST BARTH

- GROUND

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- STYLES -

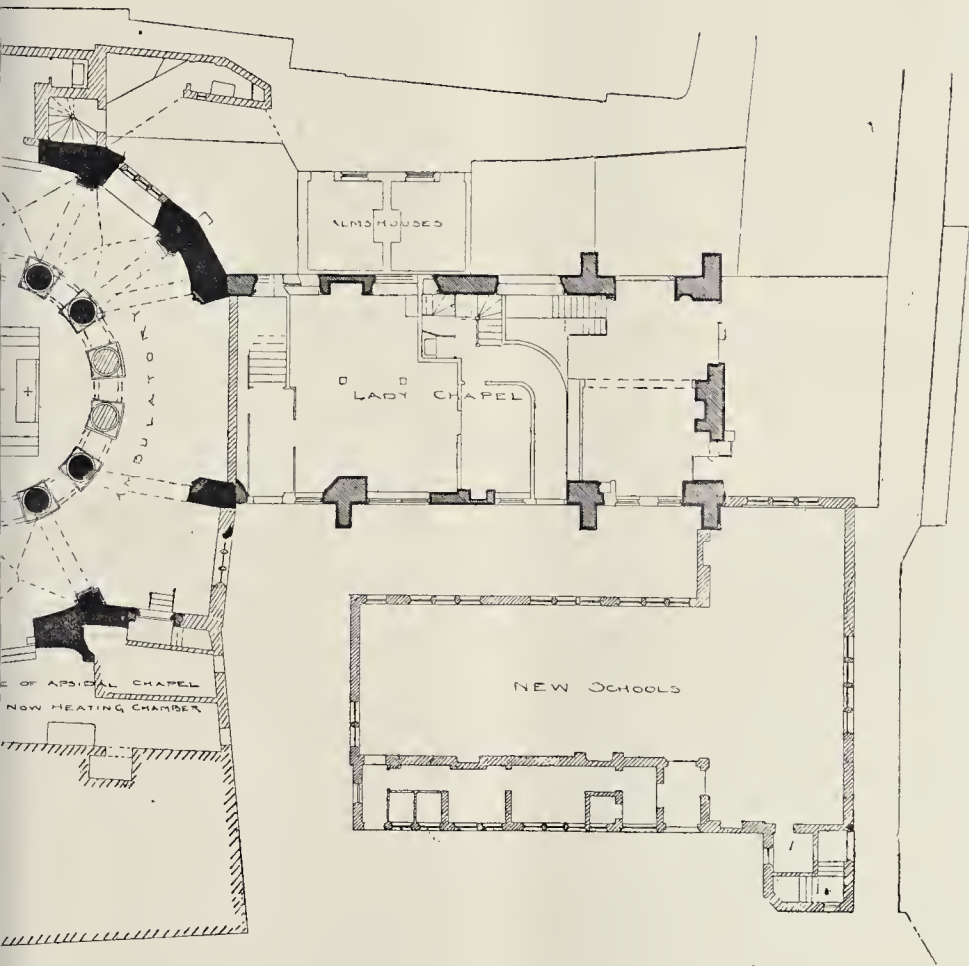
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course of erection. The most interesting feature that has been brought to light during the erection of the latter has been the fifteenth-century stone screen across the transept arch, and which formed a screen to the back of the stalls, which, it is known, were carried under the crossing. A similar screen probably existed on the south side, though there is now no trace of it.

A porch is added to the north transept to provide a much-needed entrance to the Church from Cloth Fair, and an entrance is also formed in the south transept. A new porch is also being built to the west entrance, and the rough wall, put up when the nave was destroyed, is being faced with flint and stone.

In the new work the pointed arch has been adopted throughout, in order to differentiate it from the old; but an attempt has been made to preserve the general scale and massiveness of the old work in the new.

Blue Bath stone is used internally, and Portland stone and flints externally.

During the work of restoration since 1883, the fringe-factory has been purchased and the east end completed; the boys' school removed from the triforium, and new schools erected on a portion of the factory site; the forge has also been purchased, and provides a site for the north transept. The remainder of the fringe-factory still conceals the considerable remains of the Lady-chapel, as will be seen on the plan. This is a cause of anxiety, as at present there are no funds to deal with it, and the factory buildings, which have already been condemned, cannot remain much longer, and if removed, the Lady-chapel would soon disappear unless the work of rebuilding could at once be taken in hand. There are a large number of parochial purposes to which the building could be most usefully put.

The whole of the work to the church has been done from the commencement most satisfactorily by Messrs. Dove Bros.

A. W.

** The three drawings of the transepts were exhibited at the Royal Academy this year. The plan has been kindly prepared by Mr. Aston Webb for publication in the *Builder*.

THE SANITARY CONGRESS.

(Continued from p. 225.)

Papers were subsequently read by Mr. Parsons (St. Luke's) on a scheme for organising Sanitary Inspectors, or Inspectors of Nuisances, being holders of recognised certificates, into an Institute of Certificated Sanitary Inspectors; by Mr. Fairchild (Clapham) on "Difficulties in the Prevention of Infectious Disease," and by Mr. Wells (Newcastle) on "The Sanitary Institute and its relation to Sanitary Inspectors."

Mr. Fairchild, while admitting the great improvement introduced by the "Infectious Diseases Notification Act" (1889) and the "Infectious Disease Prevention Act" of 1890, which had both been made compulsory in the "Public Health London Act" of 1891, pointed out defects existing in certain details which were calculated to rob the public of the protection intended to be given. Where a busy Medical Officer, who had charge of a case under the Acts, put off till evening the required notification, dangerous delays often occurred. It frequently happened that several hours, if not a day or two, elapsed before the notification from the medical practitioner in attendance was received by the Medical Officer of Health; during this time the patient might have been in contact with the other members of the family without anything being done towards isolation. If every Sanitary Authority insisted upon the notification from the head of the family, a large number of cases of infectious disease would be prevented. The provisions of the Education Acts, too, led school teachers to adopt all kinds of expedients to secure constant attendance from their children without regard to the dangers that might arise. Parents, too, often showed a wicked disregard of the welfare of the community by sending to school at times children they knew to be infected, in order not to lose an attendance medal or other school prize. Instances of reprehensible conduct of the kind, both on the part of teachers and of parents, were adduced. Unwillingness to go to hospital, or to undergo inspection, were other difficulties in the way of the Inspector. It would greatly assist in carrying out disinfection if the medical gentleman attending

infectious cases kept at home was compelled to notify the recovery of the patient. In disinfecting it was impossible to be always certain that every infected article is placed in contact with the vapours in use. Many persons believed that disinfection meant destruction, and, consequently, many infected articles were purposely removed. Many of the difficulties in the prevention of infectious disease were simply the result of ignorance and prejudice, and might be remedied in a few years by making Hygiene a compulsory subject in every school throughout the Kingdom.

In the discussion which followed, Messrs. Wootton, St. George's, East, representing the Western District; M. Addiscott, Exeter; Bolton, Burslem; Wilkinson, Derby; Sumner, Wigan; Nichols, Northampton; Lowry, Wolverhampton; Edwards, St. George's, Southwark; Cowdroy, Kidderminster; and Dr. Kealey, Gosport, Vice-President of the Congress, took part, and almost without exception the proposal to make notification of infectious diseases compulsory was approved.

Mr. Wells's paper was replete with practical and important suggestions for the improvement of the educational and professional status of the Sanitary Inspector. He demanded the admission of Inspectors to the privilege of membership of the Sanitary Institute, with right of nomination on the Council. He wanted higher-grade certificates of three categories.—Second Class, First Class, and Honours Class,—the existing certificate to be styled the Elementary Certificate. He called upon the Institute to request each local authority to send at its own cost, annually, its Inspector to the Congress, and to form a committee to draft a Bill, as a model sanitary statute, and to use all its influence to secure the enactment of such a measure. During the discussion which followed, the Secretary of the Sanitary Institute, Mr. E. White Wallis, explained that there was no law or by-law to prevent Inspectors becoming members. They had only to be nominated in the ordinary way, and if the Council thought fit they would be elected in due course. The Sanitary Inspector had no special claim to be admitted either as a member of Council or an ordinary member, for the Institute had no *ex officio* members. Members after one year might be proposed as Fellows, and then could be nominated to seats on the Council, but Associates were not eligible.

The proposal in favour of higher grade certificates was lost after an explanation from Mr. Symons, Registrar of the Institute, in which he pointed out that the examinations were being stiffened continually, and that the grade of the certificate was thereby being raised as rapidly as practicable. The four following proposals of the paper were adopted as recommendations to the Council:—

1. The admission of Sanitary Inspectors to the membership of the Institute.
2. The admission of Sanitary Inspectors to the Council of the Institute.
3. That the Institute request each Authority, at its own cost, to annually send to Congress its Inspector of Nuisances.
4. That the Institute form a committee for the drafting of a Model Sanitary Statute, and do all in its power to accomplish its enactment. Said committee to include, by invitation of the Institute, such local government officers in England and Wales as would in their opinion be useful, whether such officers are members of the Institute or not.

Mr. Bell, Chief Inspector, Portsmouth, urged the necessity of the appointment of a committee to the Local Government Board in favour of some superannuation and pension scheme for Sanitary Inspectors. In the event of failing to get a scheme of direct superannuation from the Board, he advocated the organisation of a fund to which the Inspectors as well as the Board should contribute. A scheme had been suggested by Mr. Bonnois (Liverpool), in which the officers should contribute $\frac{3}{4}$ per cent. and the Board $\frac{1}{2}$ per cent., and there was a similar proposal made by the Corporation of Manchester. He concluded by moving:—

That Sanitary Inspectors or Inspectors of Nuisances should be eligible for superannuation, the same as officers under Government or the Poor Law Board; or, that it is highly desirable that a fund should be founded for that purpose, to which both Inspectors and Local Authorities should contribute.

A committee of nine, nominated by the meeting from among those present, was subsequently appointed to consider a superannua-

tion scheme in accordance with the resolution, Mr. Bell afterwards moved:—

That it is desirable that the enlarged powers given to the Metropolis under the Public Health (London) Act, 1891, should also apply to the provinces, and that such powers be given by a new Public Health Act.

The resolution was adopted. Mr. Wilkinson (Derby) read a paper on "Needed Reform in Sanitary Administration," in which he advocated a high educational status among Sanitary Inspectors, with a proper recognition of the importance of his office and his responsibilities. The appointment of more qualified independent Inspectors, with increased powers and clearly defined duties, would do far more good than any Sanitary Regulations Bill. The paper concluded with the following suggestions:—A complete inspection of every building in accordance with the Acts of 1875 and 1891. An independent Department to deal with nothing but questions of sanitary inspection and construction in connexion with new and old buildings. The compilation and keeping of complete registers of drains and sanitary apparatus, and regulations to prevent any alteration or addition without the sanction and supervision of the Sanitary Department. The establishment of a Government Department of Health to supervise all questions of sanitation, and grant qualifying certificates, and the employment as Inspectors of those persons only who have served an apprenticeship to the work or to the plumbing trade, and passed an Honours examination in plumbers' work.

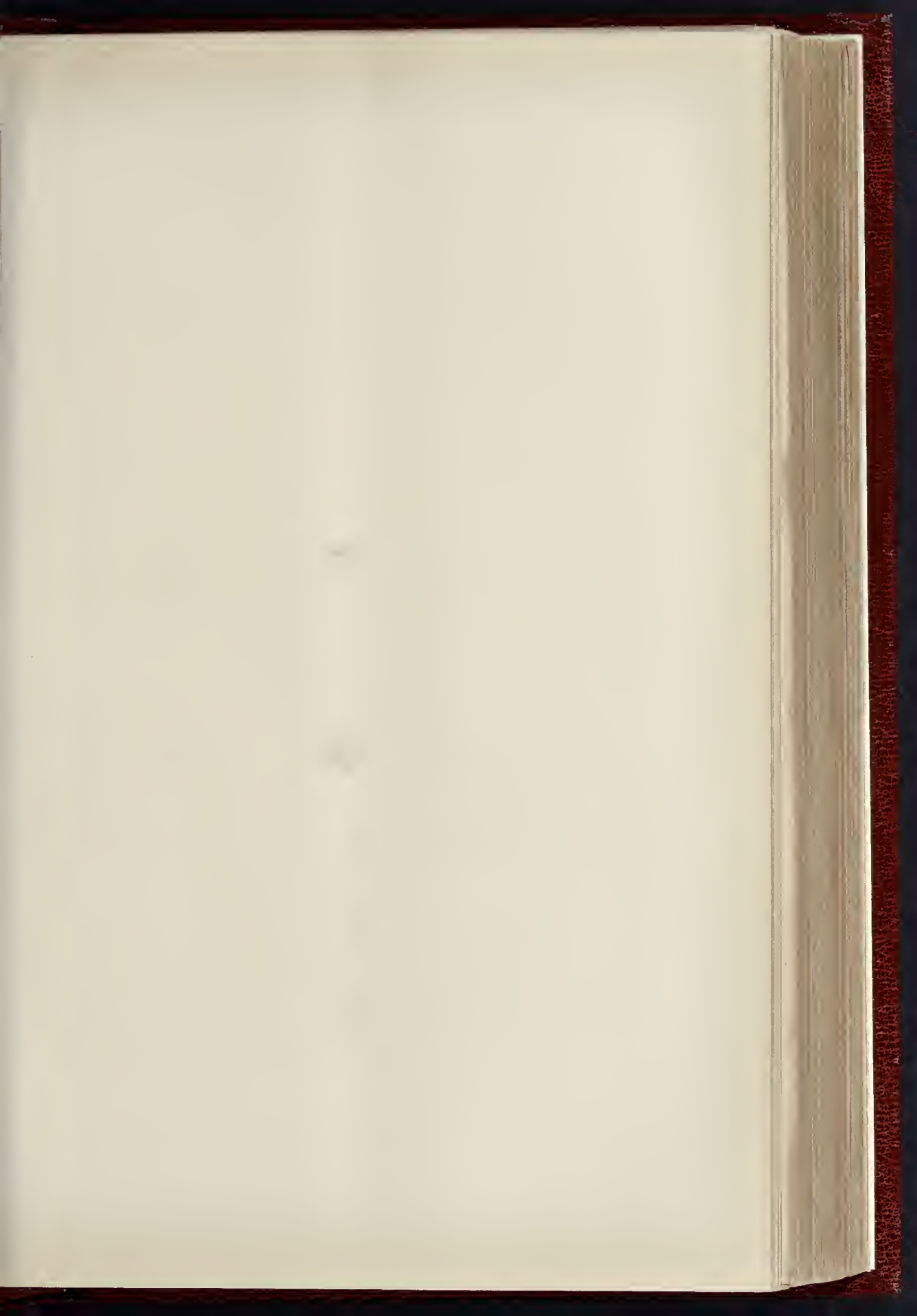
The proceedings concluded by the voting of thanks to Professor Wynter Blyth, Dr. Kealey, Vice-President, and the Joint Secretaries, Mr. Bell (Portsmouth) and Mr. Beel (Gosport). The members of the Conference afterwards went on an excursion to visit the Pumping Station Sewage Tanks and the Bow Lunatic Asylum, under the conduct of the Hon. Secretaries.

Medical Officers of Health.

After an address by the President, Professor C. Kelly, M.D., papers were read on "Isolation Hospitals," "The Organisation of Village Sanitation," "Water Analysis and Purification," and on "Meat from Tuberculous Animals." The result of the census of 1891 was the principal theme of Professor Kelly's address. The estimated population was more than 700,000 in excess of the actual number, which proved to be 29,001,000 for England and Wales, or an increase of only 11 per cent. for the decade, instead of 14 per cent. as estimated. The excess of births over deaths was in 1890 lower than at any period of the present century. The diminution could only be accounted for by a decrease in the marriage-rate. There were in this country 900,000 more females than males, and the excess was all in urban districts, the numbers in rural districts remaining as at the previous census. He feared they could not look forward to much further decline in the death-rate, for as time went on there would be an accumulation of old people. The returns, he was sorry to say, were not always accurate, and he feared that faith in the happy indications of a low death-rate would be shaken unless they could find out some means of obtaining greater accuracy. He urged the importance of a requisition being sent to the Government by the Sanitary Institute for a quinquennial instead of a decennial census. Papers were subsequently read by Dr. J. Groves, advocating the isolation of all cases of infectious disease in isolation hospitals, a resolution to memorialise the Local Government Board being adopted; by Dr. A. E. Harris (Islington), urging the treatment of phthisis compulsorily as an infectious disease; and by Dr. J. C. Blackman (Portsmouth), advocating the compulsory removal of all persons suffering from infectious diseases, irrespective of their social status. A resolution in support of the doctor's views was adopted.

Domestic Hygiene.

The ladies who took part in the Conference met in the Grand Jury Chamber, and were presided over by Mrs. Ernest Day, ex-Mayress of Worcester, who took the place of Lady Douglas Galton, the President, who was unavoidably prevented from being present. Sir Charles Cameron, President of the Institute, briefly opened the proceedings, explaining that this was the first occasion on which a branch of the Conference had been held specially for



THE BUILDER SEPTEMBER 17, 1892.



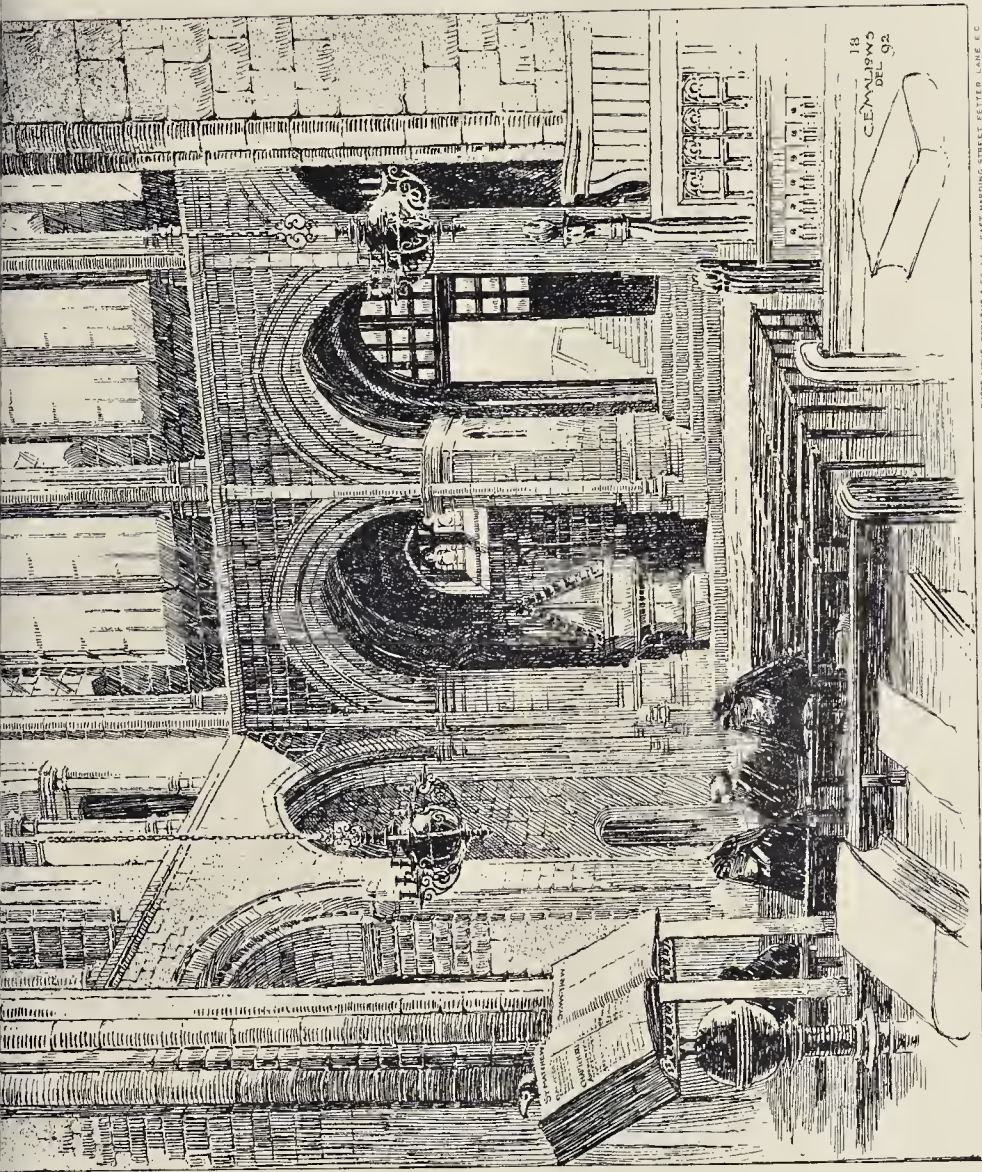


PHOTO LITTO. SPRAGUE & CO. 48 & 49 EAST MADISON STREET PETER LANE N.Y.C.

THE NEW SOUTH TRANSEPT: ST BARTHOLOMEW THE GREAT, SMITHFIELD.—MR. ASTON WEBB, F.R.I.B.A., ARCHITECT

Royal Academy Exhibition, 1892

women, who, however, he thought would form a most important auxiliary to the matron. Mrs. Day then delivered a brief inaugural address on "Our Opportunities of Spreading a Knowledge of Hygiene to Women and Girls." She referred to the value of hygienic knowledge to women, and showed how the untrained might obtain that knowledge. When they possessed it, there was a natural desire to spread the knowledge to those less instructed. She enumerated several organizations that already existed, and which might be adapted for instruction in hygiene, or in God's laws, physical and spiritual. Miss Ethel Sampson, lecturer on Hygiene and Sick Nursing to the Ladies' Sanitary Association, spoke on "Food with Special Relation to the Sick." Miss Barnett opened the discussion. Dr. Williams-Freeman spoke on the chief hygienic causes of mortality among young children, and Miss Charlotte A. Smith urged the importance of physical training for both boys and girls.

English Homes.

Sir Thomas Crawford, Chairman of the Council of the Institute, delivered a lecture in the evening to a large audience at the Town-hall, of which the following is a summary:—
The love of home was proverbial with Englishmen, who were proud of their ancestors and of their traditions. "Sprung from such men, and inheriting such traditions," said Sir Thomas, "our homes ought to be considerably in advance of other nations. Are they so? If the imposing mansion in which I write, occupying a conspicuous position in one of the most fashionable watering-places in England, a stagnant atmosphere is but too perceptible in the corridors, while a vigorous use of open windows barely suffices to make the public rooms habitable. The picture of our English homes sketched by the Countess de Visca in a paper read at the Congress at Leicester, and published in the 'Transactions for 1885-6,' shows ample evidence of the pressing need that exists for further improvement in almost every detail of domestic sanitation. With regard to externals, the house itself must stand on a healthy site. This consideration is no doubt present to the mind of anyone seeking a mansion or a house of even much less pretensions, but it is too often altogether overlooked by the cottager; and anyone who takes note of the present system of disposing of so-called rubbish in and about great cities, and the rapidity with which ground made out of what was but yesterday a mere swamp, is covered by cottages, too often constructed without these safeguards devised to protect the inmates from damp and ground air, must see the danger which lurks beneath. There is another aspect in which this subject must be viewed. Sunlight is a most important and essential element in regard to the salubrity, as well as the suitability, of a house for residential purposes. No apartment is really fit for human habitation which is not freely traversed by sunlight. If by the direct rays of the sun, so much the better. Those of you who have studied the influence of light on the development of colour in the vegetable, and indeed in the animal world also, need not be told that healthy growth is not attainable without a reasonable supply of that vivifying influence. A good water-supply was an obvious necessity for every dwelling. "Thanks to the liberality," he continued, "of some among us, drinking fountains for man and beast are to be seen in yearly-increasing numbers along our great thoroughfares, and in places where the people are apt to congregate; but this is not enough; every street and alley, as well as every inhabited house, should have a continuous water-supply as one of the necessary requisites to be provided by the owner, and his power to recover rent should be made conditional on the efficiency and sufficiency of this supply. Add to this an efficient water conservancy, with powers adequate to prevent the pollution of our rivers, and to enforce an effective scavenging, and suitable disposal of all sewage and other filth now permitted to drain in our watercourses, or foul our village wells, and there need be no fear of a waterfamine in this country, even with a further great increase of population." The interiors of our houses, their ventilation, the prevention of draughts, the proportion between walls and windows, and the cubic space necessary per person, were criticised, and the lecture concluded with reference to the housing of the masses. "The housing of the middle and lower classes in large towns has

been in the past, and still is, largely in the hands of speculative builders, who hope for a profitable return on capital so invested. Of such buildings it may be said, without attributing any improper motive to the builder, that cheapness of material, economy in their use, and on the class and quality of the labour expended on their construction, are ever-present elements in the builder's estimate of cost. It is, presumably, to such considerations that leaking roofs, walls pervious alike to air and moisture, ill-fitting doors and windows, and badly-jointed floors, are not uncommon defects in town houses rented at sums ranging from 100*l.* to 20*l.* annually. These defects must be remedied by the tenant as best he can, hence his resort to carpeting, curtains, wall-papers, &c." In a final passage this overcrowding was again referred to. "The housing of the working classes is in a fair way of being satisfactorily provided for, but nothing has yet been done to provide suitable accommodation for the poorest class of the people not actually paupers. Many of them are infinitely worse off than the regular inmates of the workhouse; but some element of self-respect, or pride it may be, constrains them to endure hardship and privation, even to the verge of starvation, rather than take that last, and to them irremediable, step of going to the workhouse. There is much need for active interference in favour of this class, and the best method of aiding them appears to be also the cheapest. House them in homes in which they will be provided with those prime necessities, pure air, good water, light, and shelter at rates which they can pay, while leaving a sufficient margin for food and clothing. The lazier should not be tolerated under any circumstances,—his gregarious and filthy habits, and his hopeless laziness and moral degradation, render his confinement to the workhouse a necessity. I do not include under this head the casual wanderer out of employ for whom other arrangements should be made; or the blind or otherwise maimed, who make a profitable display of their misfortunes. All such should, of course, be compulsorily assigned to asylums supported by the State. After all that can be done has been realised, benevolence will still have a wide field for its exercise."*

COMPETITIONS.

PROPOSED TOWN HALL, WALSALL.—We are informed by the Town Clerk that the Corporation have decided to appoint a professional assessor to adjudicate upon the plans for the new Town Hall, Walsall, when received, but the selection of the assessor has not yet been made. He will, it is added, undoubtedly be a gentleman of standing in the profession. We gave particulars in the *Builder* for August 6, page 112, of the preliminary competition, which was for the purpose of ascertaining the maximum accommodation which could be obtained on the site.

TECHNICAL SCHOOLS, ACCRINGTON.—In an open competition for new technical schools at Accrington, the designs of Messrs. Morley & Woodhouse, architects, of Bradford, have been awarded the first premium.

FOUR BOARD SCHOOLS, MANCHESTER.—A special meeting of the Manchester School Board was held on the 9th inst., for the purpose of selecting architects for the four schools which it is proposed to erect shortly. The clerk read the minutes of the General Purposes Committee, which recommended that the following appointments be made:—Messrs. Royle & Bennett as architects of the Cheetham Hill Higher Grade School, Messrs. Maxwell & Tuke of the Devonshire-street Higher Grade School, Mr. H. E. Steilfox of the Ashton Old-road School, and Messrs. Preston & Vaughan of the Burgess-street Infants' School. The total estimated cost of the new schools is £32,000. The Chairman (Mr. E. J. Broadfield) moved, and the Rev. J. Watson seconded, the reception and confirmation of the minutes. After some discussion the motion was agreed to.

THEATRES BURNED DOWN.—The City Theatre, Cordova, has been totally destroyed by fire, and a similar fate has overtaken the Teatro Sociale in Biella, Sardinia. The latter had cost 300,000 lire.

ELECTRIC LIGHTING.—We are informed that Andrews's concentric wiring is being adopted in the electric lighting of five of the chapels and dining-halls of the colleges at Cambridge in order to avoid the disfigurement of the interior that would result by using wood casing.

* We shall continue our report next week.

Books.

Les Artistes Célèbres. Corot. Par L. ROGER-MILÈS. Paris: Librairie de l'Art.

THIS is one of the series of this octavo volumes on eminent artists issued from the *Librairie de l'Art* in the Cité d'Antin, others of which have been noticed from time to time in our columns.

The success of Corot was so late, the first fame of his works in this country especially hardly counting twenty-five years back, that it will surprise many who were not previously acquainted with the facts of his life to learn that he was born as early as 1795. He was, in fact, almost an old man before his reputation was gained even in his own country. His mother was "Madame Corot, Marchande des Modes," whose shop was at the corner of the Rue du Bac and the Pont Royal, and Corot himself was apprenticed to a draper, and pronounced by his master to be of no good in that line of business. His parents were well off, and gave way to his wishes in allowing him to indulge that "useless pastime" of painting, with an annual allowance of 1,500 livres to live upon, and Corot sat down to paint his first picture on the banks of the river a little above the Pont Royal. On the whole it may be said that he was not badly treated by his parents, considering that they knew nothing of art and could not in the least understand his devotion to it.

M. Roger-Milès quotes some critiques on landscape painting written at the time when Corot commenced his work, illustrating the prevalent feeling about landscape at that time, and its dry scholastic division into "paysage historique" and "paysage champêtre." Corot had something different to show, but his artistic companions for a long time did not take him *au sérieux* as a painter. They liked him and his simplicity, and his good humour, and his songs, which he sang in a clear tenor voice, but did not make much account of his art; and in 1835 a critic said of his work in the Salon "Sa touche est lourde et mate; la souplesse, l'humidité, la charme de la nature lui sont étrangers." Alfred de Musset wrote briefly in 1836 "Corot, dans la *Campagne de Rome*, a de grands admirateurs." It was not until well on in his forties, however, that he became at all widely accepted, even among competent critics, as a painter of a high order. A critique by M. Lagenevais, written in 1849, is one of the first which attempts to gauge the nature of Corot's genius and to recognise him as an original painter; and he says that the prominent quality which strikes one in Corot's works is "l'absence de facture," the employment of always the most simple and direct means to produce his effects. We should hardly agree with this. To our thinking Corot had a very special and individual *facture*, the prominent quality in which was the art of conveying the impression of detail without really giving any of the detail; representing the effect of thin sprays half-clad with leaves, while escaping altogether from any precise or hard lines in the indication of the foliage. Another point in Corot's art on which his biographer touches with true critical insight was his treatment of figures in landscape. He was not content to put in a figure or two to scale a landscape, neither was he one of those painters who would render the figure the prominent interest of the picture, and add a landscape background to it. His aim was to render his figures so completely a part both of the composition and the sentiment of the landscape, that the one element seemed inseparable from the other; the figures were a part of the very sentiment of the scene. It was not necessary with this object to finish the figures highly; they would have started out, in that case, too brusquely from the ideal plane of the composition; he treated them as he treated his trees, suggesting detail in a broad fashion, but allowing nothing to become too hard or precise. In some of his principal works he has achieved this poetic blending of figure and landscape so perfectly and with such power of suggestion that he may almost be said to have created in this class of work a new phase of ideal painting. In regard to one of his finest works of this class "Orpheus and Eurydice," it is interesting to note that this was inspired by his great admiration for Madame Viardot-Garcia's performance of the part of Orpheus in Gluck's

opera. A less imaginative artist would have painted a picture of the scene with a portrait figure of the singer; Corot made a new creation out of it.

The traits of the artist's character given in this account of him show him to have been one of the most lovable, as by those who knew him he was evidently one of the most beloved of men. It is to be regretted that the book gives us no fac-similes of the artist's own sketches, such as we have had in other volumes of the series. The illustrations, however, are exceedingly well executed, and in their pen-sketches from the master's works MM. Alfred Robaut, Yon, and Daliphard have dealt ably with the difficult task of preserving in this medium the feeling and sentiment of the original works.

Transactions of the Seventh International Congress of Hygiene and Demography, Volume VI, Section VI. "Architecture in Relation to Hygiene." London: Eyre & Spottiswoode.

THIS volume of the Transactions of the Congress of Hygiene contains the papers, and some brief report of the discussions, in the Architectural section of the Congress. Most of the papers were reported at more or less length in our columns at the time, and several of them in full. Many of the ideas embodied in these papers, and some of the suggestions thrown out in discussion, are worthy of more serious and detailed consideration than could be given to them at the moment. In the discussion on the first paper, a rather vague one on Open Spaces, we notice Mr. Rogers Field's important suggestion that every opportunity should be seized before new building schemes could intervene, for securing planted boulevards between open spaces. He mentioned among one of the chances lost, that of making a splendid boulevard between Regent's Park and Hampstead Heath, an idea suggested forty years ago, but neglected then. Other similar chances may be lost now or in the course of a few years, which if made the best of would be a boon to generations to come. Herr S'ibben's paper on "The Hygienic Principles of the Extension and Internal Arrangements of Cities" presents a great deal of practical advice and experience in a concentrated form, though the principles of treatment recommended are on a very large scale, and such as can only be very gradually and perhaps only partially realised in towns in which old buildings and streets are mingled with new. Following upon this, Mr. Blashill's short and practical paper on the "Control of the Construction of Dwelling Houses" carries out the further consideration of the subject more in detail, and in the course of the discussion on it Dr. Sykes urged the importance not only of providing for the proper construction of dwelling houses built as such, but of providing against the occupation as dwelling-houses of buildings not erected with that object and consequently not fitted for such occupation. There is of course sufficient legal power to deal with such cases; the point is that they are or may be overlooked. M. Trélat's paper dealt with the same class of subject from another point of view, and also suggested some points often overlooked, especially the influence of window area in lowering internal temperature, and the influence which extent of window area ought to have on the thickness and construction of walls. The papers by Mr. Lennox Browne and Mr. Ernest Turner on the Sanitation of Theatres, form a very valuable résumé of the subject, and were reported and illustrated in our columns by reproductions of most of the plans exhibited, which reproductions, we are glad to see, are incorporated in the pages of the Transactions. In the course of the discussion a French visitor, M. E. Beuchon (an architect and member of the Paris Commission on unhealthy dwellings) expressed the surprise with which he and other French visitors to London noticed so many cellar dwellings in various classes of buildings, and mentioned that after the fire at the Opéra Comique a stringent law was passed one of the provisions of which was that no part of the auditorium should be below ground. We note this on account of its remarkable contrast between the practice now being established in England of sinking a large part of the auditorium below the ground level, in those which are considered the best and most sanitary theatres of recent construction. The questions of "Common Lodging Houses," and that of "Cottage Homes for the Industrial Classes" are treated respectively by Mr. Gordon Smith and Mr.

Rowland Plunbe; and that of "Block Dwellings for the Industrial Classes" by Dr. Sykes, to whose paper we may call special attention at a time when this class of block dwelling is being so largely erected. Dr. Sykes's calculations and diagrams as to the extent of cubic space which may be occupied by buildings in relation to the area on which they stand ought to have serious attention, as it is a common fallacy, in practice if not in theory, to place lofty blocks of this kind far too close together on the area, forgetting that in proportion as we increase the height of the buildings and the number of inhabitants in a vertical direction, in nearly the same proportion must we space out and isolate the buildings in a horizontal direction. The papers on hospitals by Dr. Thorne Thorne and Mr. Keith Young are valuable summaries of this subject under certain of its aspects.

It is to be hoped that this small volume, which contains such an amount of practical suggestion on the sanitary conditions of building, will receive attention both from architects and the general public; it is a small and inexpensive volume, and well worth procuring by all who are interested in the subjects treated of.

Garden Design and Architects' Gardens: Two Reviews, illustrated, to show by actual examples from British gardens, that clipping and aligning trees to make them "harmonise" with architecture is barbarous, needless, and inartistic. By W. ROBINSON, F.L.S. London: John Murray, 1892.

THIS is a landscape-gardener's revolt against the modern teaching of the architects, and especially against the two books by Mr. Blomfield and the late J. D. Sedding, for which Mr. Robinson has no sufficient expressions, apparently, of anger and contempt. He has, in fact, rather overdone his indignation, leaving on the reader's mind the impression of a manifest conviction that "this our craft is in danger to be set at naught," and though the illustrations are many of them very pretty pictures, we do not think that they prove much to the author's purpose, while the literary style of the book is not calculated to raise the reader's opinion as to the intellectual culture of landscape-gardener *versus* architect.

The claim of the architect to be the directing mind Mr. Robinson evidently does not understand. He thinks that because gardeners understand the horticultural treatment of vegetation they are to claim to understand the art of gardening design also. The two things are perfectly distinct, but we do not expect Mr. Robinson to understand that. He is violent in his assertions that there is an art in landscape-gardening, but does not seem able to define what it is.

To some of Mr. Robinson's sarcasms about "vegetable sculpture" the two architect writers laid themselves open, and we have no defence for and no sympathy with the clipping of trees or hedges into imitative shapes, the simple clipping them into formal shapes may be good or bad according to circumstances, according to the style of the house and the closeness of the relation between the house and the garden. But there can be no question at all that the system of laying out grounds in relation to the architectural style of the house is a matter within the architect's province; that the house and garden ought to be considered as a whole, and that the landscape-gardener as a rule entirely neglects this, while his so-called artistic laying-out of a garden is merely a trick of imitating natural effects, which is not worth doing, and which, if it were, any one can do. In fact, there is no art of landscape-gardening at all, and the pretence of it is an imposture which the world is getting impatient of.

If people want an informal garden they do not require a professional person to lay it out for them. All they will get by that is the introduction of various kinds of sham picturesque; artificially winding walks and artificially introduced clumps of trees, pretending to be natural. The trees are beautiful no doubt, but the landscape-gardener did not make their beauty; and they would be as beautiful without the house as with it; they have no relation to it. The house is a creation of art, on the other hand, and its effect is greatly enhanced by connecting it with a formal treatment of the ground, which seems to extend and glorify the architectural treatment of the house. And to do that is certainly an architect's work; no landscape-gardener understands it, for the simple reason that no landscape-gardener understands

architecture, as far as we ever knew. They have at all events taken much trouble in their books to prove that they did not understand it.

The general literary style of the book is so much worse than commonplace, that we can only express surprise that it should ever have been issued from the house of the first publisher in London. It is not a credit to the traditions of "Murray."

Hints on Chip-carving, Class Teaching, and other Northern Styles. By ELEANOR ROWE. London: Sutton, Drowley, & Co.

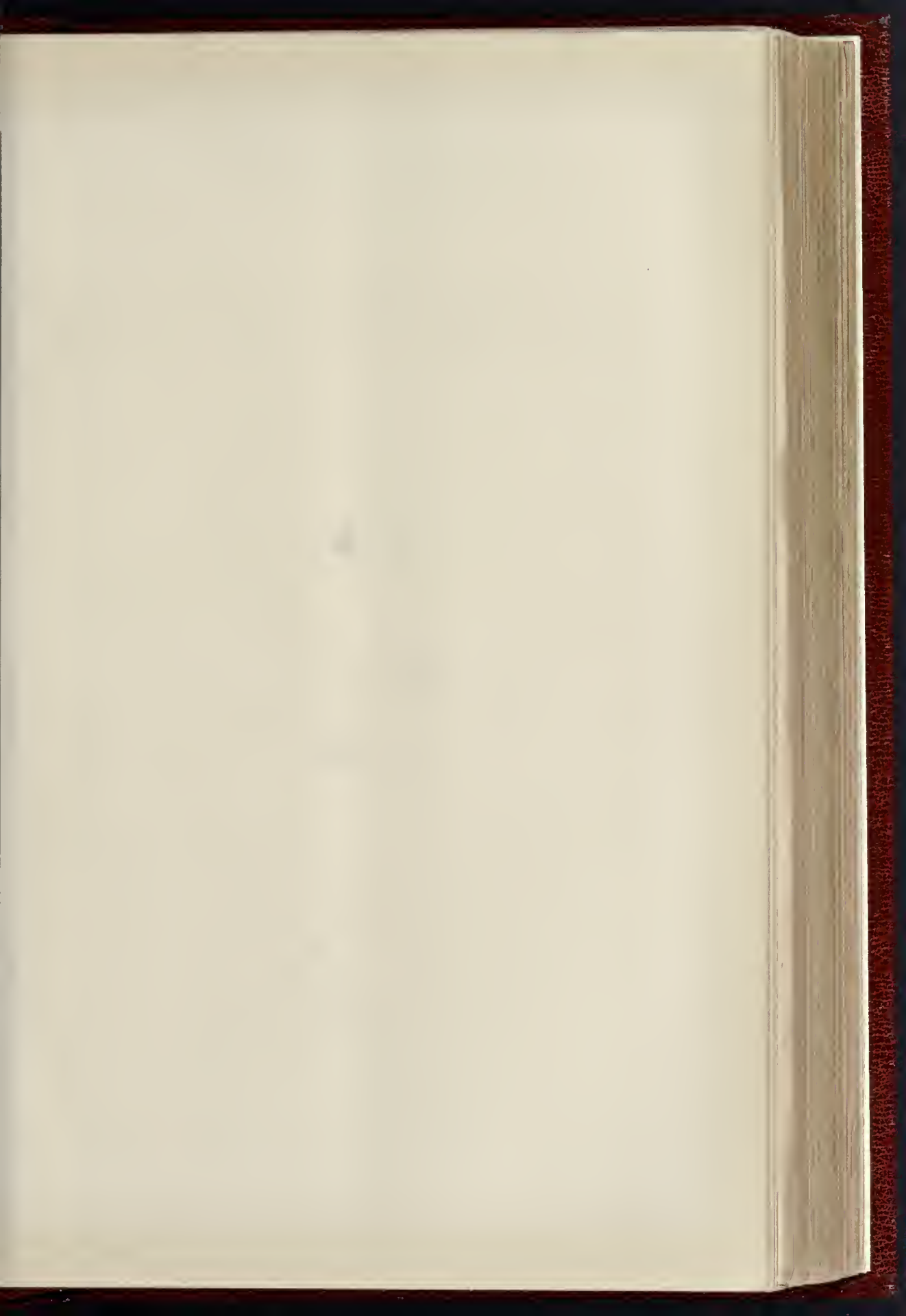
"CHIP-CARVING," as we understand it from Miss Rowe's pages, means a simple style of surface ornament produced by cutting out chips of wood from a plane surface, leaving a pattern formed by the indentations between the untouched surfaces, as in a wood engraving, which is a more elaborate application of the same kind of process. It differs from carving proper in that there is no modelling of surfaces in relief, and is the principle on which many elaborate designs in wood are produced in Norwegian work. It may therefore be regarded as a more simple style of carving, within the reach of many who may not have time or talent to go into the more elaborate forms of art workmanship in wood.

Miss Rowe goes into the process in a very thorough manner, prefaceing the remarks on actual work by a chapter on geometrical drawing, intended to prepare the student for setting out that kind of geometrically arranged patterns which are most suitable for this class of work. The method of work is illustrated by small and simple designs showing various ways in which surfaces can be cut so as to produce form and contrast of light and shade; and there follow some examples of more elaborate designs produced by the definition of scroll-patterns by sinkings in the wood. We are glad to be able to add that these designs are of very good quality, and calculated to form the taste of the student as well as to improve his mechanical capacity in the work. The work is a very useful one for its purpose.

A Manual of Practical Instruction in the Art of Brass Repoussé for Amateurs. By GAWTHORP (Artificer in Brass and Iron). London: Sutton Drowley & Co. 1892.

THE directions for practical working of brass repoussé seem to be clearly and intelligently given, with sufficient illustrations for practical purposes. There are no "designs" given, which in small hooks of this kind on art-workmanship are generally the weak point, and thus "Gawthorp" (who seems to despise the use of initials) has accepted one pitfall. We can recommend his small book to amateurs who wish to try their hands at brass repoussé, as a useful manual on the subject, though the concluding sentence, that advice, hints, and assistance "can always be obtained at Gawthorp's metal works, Long-acre," savours a little too much of an advertisement.

LECTURES AT THE SANITARY INSTITUTE.—The following lectures and demonstrations for sanitary officers, at the Parkes Museum, are arranged for Tuesdays and Fridays at eight p.m.:—October 4, "Ventilation, Warming, and Lighting," by Sir Douglas Galton. October 7, "Principles of Calculating Areas, Cubic Space, &c.," by Mr. H. Law. October 11, "Water Supply, Drinking Water, Pollution of Water," by Dr. Louis Parkes. October 14, "House Drainage," by Mr. W. C. Tyndale. October 18, "Sewage Disposal," by Professor H. Robinson. October 21, "Sanitary Building Construction," by Mr. H. H. Collins. October 25, "Sanitary Appliances," by Professor Garfield. October 28, "Details of Plumbers' Work," by Mr. J. Wright Clarke. November 1, "Sewage Disposal of Refuse," by Mr. T. De Courcy Meade. November 4, "Diseases of Animals in relation to Meat Supply; Characteristics of Vegetables, Fish, &c., unfit for food," by Prof. A. Wynter Blyth. November 8, "Infectious Diseases and Methods of Disinfection," by Mr. Shirley P. Murphy. November 11, "General Powers and Duties of Inspectors of Nuisances," by Mr. J. E. J. Sykes. November 15, "Objects and Methods of Inspection," by the same. November 18, "Nature of Nuisances, including Nuisances the abatement of which is difficult," by the same. November 22, "Trade Nuisances," by Prof. A. Postock Hill. November 25, "Sanitary Law, England, Scotch, and Irish; General Enactments; Public Health Act, 1875; Model By-laws, &c.," by Prof. A. Wynter Blyth. November 29, "Sanitary Laws and Regulations Governing the Metropolis," by the same.



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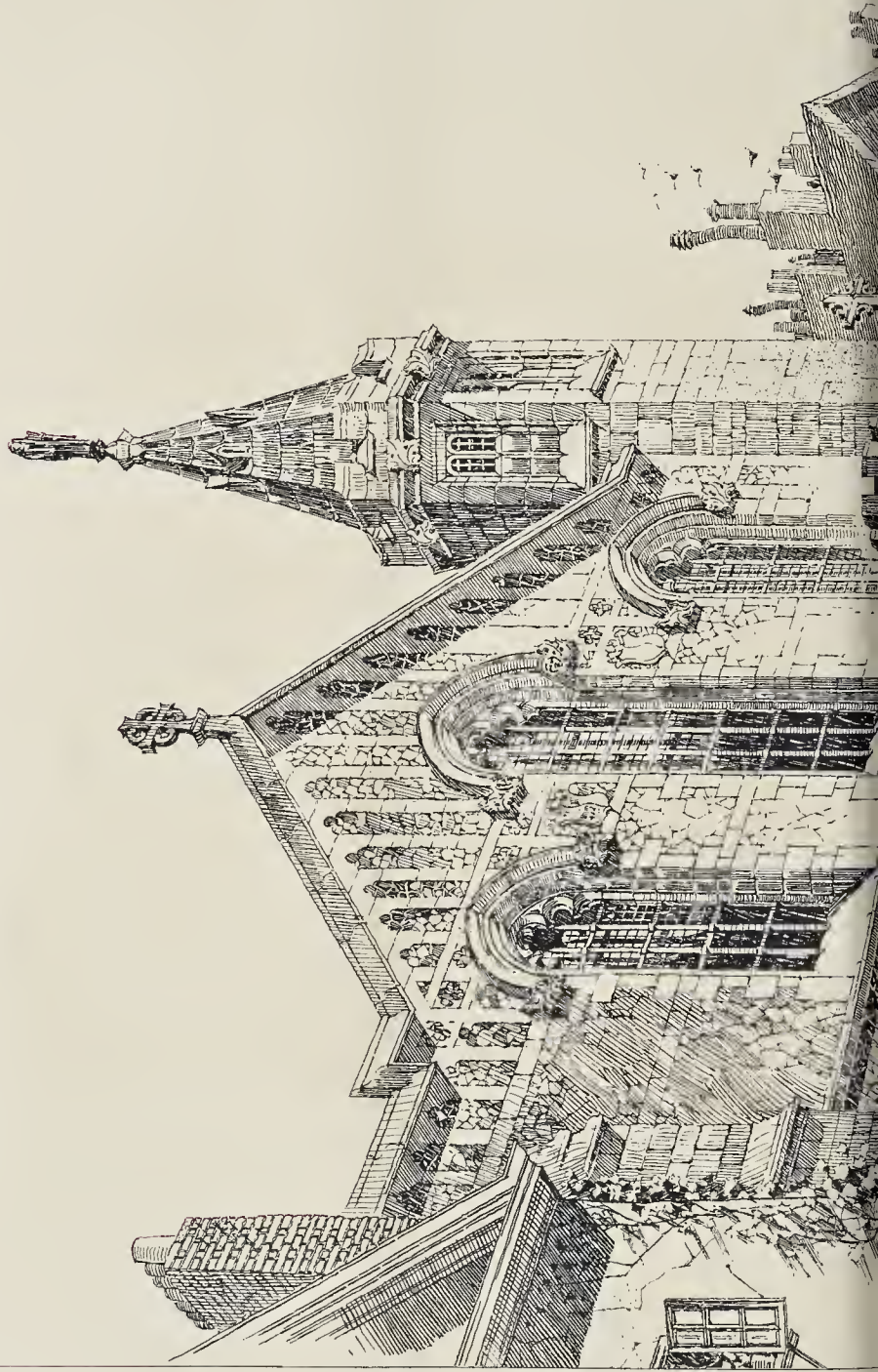
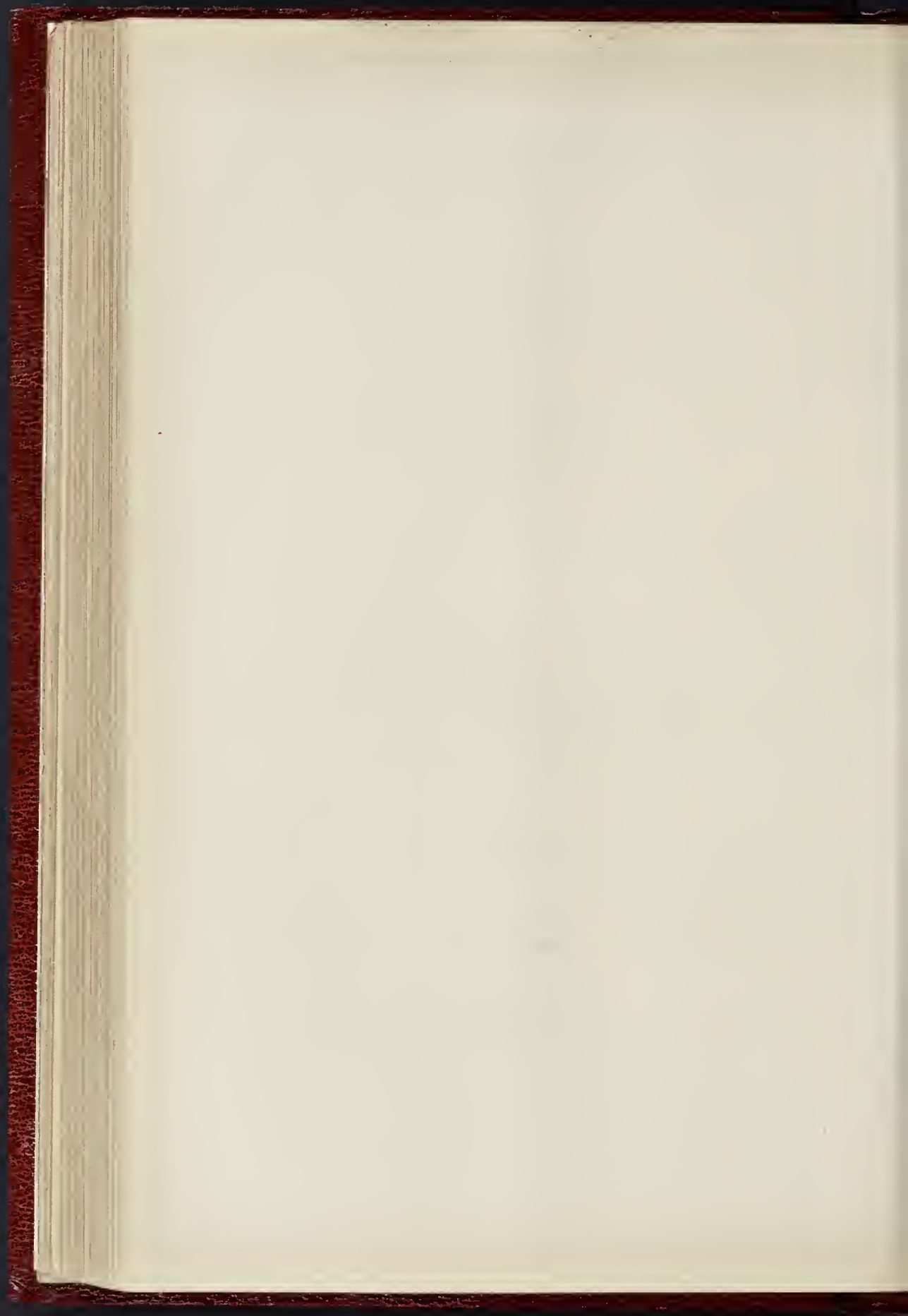




PHOTO LIND, SPRAGUE & CO. 145 EAST MADISON STREET, CHICAGO, ILL. U.S.A.

EXTERIOR VIEW OF THE NEW NORTH TRANSEPT: ST. BARTHOLOMEW THE GREAT, SMITHFIELD.—MR. ASTON WEBB, F.R.I.B.A., ARCHITECT

Royal Academy Exhibition, 1892.



Correspondence.

To the Editor of THE BUILDER.

ARTISTIC COPYRIGHT.

SIR,—There is a certain obscurity in the law of copyright concerning the preliminary sketches made by an artist or an architect, before commencing the actual drawing which is approved of. In the case of Barry and the Houses of Parliament it would appear to have been ruled that they all belong to the employer. Now many preliminary sketches frequently contain ideas not carried out or shown in the ultimate design, and the ruling is absurd. Still it is law as many lawyers read it. The safest way, therefore, for every architect or artist—and all should know it—is to write on all preliminary sketches, "Copyright retained by" so and so. The question should be settled, and some of your readers may have a better method in view.

N. H. J. WESTLAKE.

P.S.—It is time that some agitation were set on foot to make the ruling more definite.

THE INSTITUTE AND ARCHITECTURE.

SIR,—It seems to be assumed that it is not possible to test by examination the qualifications of candidates for the fellowship of the Royal Institute of British Architects.

I can quite understand that many an architect in the "fifties" might be too "rusty" for an examination in history and in theory, which to one in the twenties would not be difficult. But surely a man is never too old to undergo an examination in his powers of design. I am myself a "person of riper years," but should have no objection to prove myself capable of designing (in strict seclusion) something which would justify my architectural standing.

If the would-be Fellow could do this, and also point to a respectable list of executed works, he ought to be admitted.

Then, to give zest to the work, let it be understood that, if the candidate desire it, his design, produced in solitude, might, with his consent, be preserved among the archives of the Institute as his "diploma" work.

My suggestion may raise a smile, but is it so very impracticable? And would it not exclude the absolute "duffer"? I am afraid that a great many of the existing Fellows would have to be classed under this heading if put on my proposed gridiron. We all know some rather severe examples, men who have done their work by "ghostly" aids all their lives. A few hours alone with a tee-square and drawing-board would expose them. But I do not ask for this. I only desire that there may be no more of them.

COMOX SENSE.

September 11, 1892.

* * * Our correspondent rather misses the point of the question, which is, What is to be the standard for examination in design? We published the other day a very clever and original elevation of a new building, in which large Classic attached columns were introduced immediately under the main cornice, the conventional architrave and frieze being omitted. We see no objection to the treatment, but it is quite possible that a conservative majority in an examining committee might have refused to pass that, on the ground that the author did not understand the use and meaning of the Classic order! The diploma work of a Royal Academician is not a parallel case with that proposed by our correspondent, as it is not the test of his claim to election, it is a work deposited after election, and is generally an inadequate specimen of its author's powers, as few artists care to give away one of their best productions in compliance with a merely formal regulation.—ED.

The Student's Column.

CONCRETE.—XII.

ARTIFICIAL CEMENTS (continued).

PORTLAND: EXPANSION.

MR. GRANT in his paper in 1880 gave the inferences, which he had drawn from the experiments of Messrs. Dyckerhoff and others. They were:—1. That all cements expand more or less when hardening in water. 2. That the expansion of good cement is so very slight that in practice it need hardly be taken into consideration. 3. That it is greatest when the increase of strength is most active. 4. That it diminishes in proportion to the addition of sand. 5. That it is greatest with new cement, and least with that which has been kept in stock. 6. That it is increased by the addition of gypsum. 7. Further experiments prove that it is greatest

with over-limed or lightly-burnt cements, and that all cements contract when drying, and expand on being put into water." The experiments to which Mr. Grant referred, were made by Messrs. Dyckerhoff on twelve varieties of cements at the ages of one, four, thirteen, twenty-six, thirty-nine, and fifty-two weeks; and prisms 10 centimetres long (= 3.97 in.) and 5 centimetres square were placed in water, and their expansion was noted in millimetres. The following table has been compiled from these experiments, the amount of expansion being here given in general terms per unit of length:—

TABLE XVI.
Expansion of Portland Cement during Hardening.

No.	Time of Setting, in Minutes	Neat Cement.			1 Cement and 3 Standard Sand.			Remarks.
		1 week.	1 month.	1 year.	1 week.	1 month.	1 year.	
1	20	-.00069	-.00113	-.00213	-.00016	-.00026	-.00043	Cement two months older than No. 1. With 1 p.c. gypsum.
2	210	-.00032	-.00002	-.00127	-.00012	-.00019	—	
3	360	-.00090	-.00158	-.00258	—	—	—	
4	600	-.00097	-.00159	-.00248	-.00027	-.00042	-.00050	
5	800	-.00413	-.00447	-.01803	-.00140	-.00443	-.00471	

The same cement was used throughout the tests here given; it left 9.8 per cent. residue on a sieve with 5,806 meshes to the square inch. It will be seen, therefore, that the expansion in water of a bar of No. 2 cement and sand, 1,000 in. long (83.3 ft.), would be only .35 of an inch at the end of a year; an expansion so little as to be practically inappreciable.

The expansion and contraction, due to changes of temperature, are not considered in these experiments; the variation due to temperature is of great importance, and is greater than the variation caused by mere hardening. Cement and concrete, however, are no greater offenders in this respect than iron and brick and stone. A bar of iron 10 ft. long, if raised to a temperature of 2,000 deg. Fahr., will expand about 1.6 in.; while a column of brick-work 10 ft. high would expand about .6 in. under the same conditions.

Specifications.—The variety of specifications for Portland cement is somewhat bewildering. We have already mentioned Mr. Gostling's list of twenty-one specifications, almost all different; but Portland cement is now better understood, and specifications ought not to differ to the extent they did a dozen years ago. It is not possible, of course, to formulate a specification which shall be suitable for all circumstances; for instance, in the great majority of cases, a slow-setting cement will be most useful, but there are cases where a quick-setting cement is quite necessary, such as foundations in running water, underpinning, &c. Some important characteristics of cement,—namely, its fineness and soundness, need not vary, and the tensile strength need vary only for those works where quick-setting cement is required. Briquettes of quick-setting cement may be specified to give lower results than those made from slow-setting.

The German standard regulations, among other things, require that the cement shall be thoroughly sound,—that a thin pat of neat cement which, after setting on glass, is placed in water, shall not crack at the edges,—that not more than 10 per cent. of it shall remain on a sieve with 5,806 meshes to the square inch (the thickness of the wire being equal to half the width of the meshes), and that cements requiring more than half an hour to set, made into briquettes with three parts by weight of standard sand, and tested after being one day in air and twenty-seven days in water, shall have a tensile strength of 227.5 lbs per square inch, and a compressive strength of 2,275 lbs. per square inch.

Mr. Grant in 1880 communicated to the Institution of Civil Engineers a specification based on the German standard regulations then in force. The chief requirements of this specification may be summarised thus:—*Fineness*, not more than [20 or 10] per cent. residue on a sieve of [5,400 or 5,806] meshes to the square inch; *tensile strength* at twenty-eight days of cement gauged with three times its weight of dry sand, which has passed a sieve of 400 and been retained upon one of 900 meshes to the square inch, to be [142 or higher number] lbs. per square inch for cement which sets when neat in less than two hours, and [170] lbs. per

square inch for cement which takes from two to five hours to set neat. If the weight and tensile strength of the neat cement be specified, Mr. Grant would insert the following clauses:—*Weight*, not less than 112 lbs. to the bushel; *tensile strength* of neat cement, at least 400 lbs. per square inch at the end of seven days, and 550 or 600 lbs. after twenty-eight days, the briquettes being one day in air, and the rest in water. Mr. Grant also required the contractor to store the cement in bulk in a suitable room until tests had been made.

Mr. V. de Michele considered that a simpler specification could be framed, which would

answer the purpose quite as well as the one proposed by Mr. Grant. He suggested:—1. The Portland cement, before being used, to stand 300 lbs. tensile strain per square inch seven days after gauging; the average of not less than three breakings being taken. 2. The cement to be finely ground, leaving a residue not exceeding 10 per cent. after passing a sieve of 2,500 holes per square inch. 3. Fat samples $\frac{1}{2}$ in. thick, made at frequent intervals, and immersed in water within one hour, to show no cracks from expansion within forty-eight hours after gauging. "He would discard the weight per bushel test, as being useless and misleading." Mr. Michele has recently suggested another specification, which will be found in the *Builder* for April 2, 1892. We reprint it here, with a few verbal alterations, so that it can be more easily compared with his specification of 1880:—"1. *Tensile strength*, 400 lb. per square inch at seven days; the test bricks to be gauged by a skilled man, with any quantity of water, in any way he likes; the average of three to be taken, which shall represent about 100 tons or less; the strain to be applied as quickly as possible. 2. *Fineness*, 10 per cent. residue on a 50 sieve (2,500 meshes to the square inch) made of wire one-hundredth of an inch in diameter; shaking to be continued until no more of the cement passes through the sieve. 3. *Soundness*, pats one-eighth of an inch thick, gauged on glass, immersed in water, and left there for the whole period, must be absolutely sound at seven days; one pat to be made for each three bricks."

It will be noticed that the second specification demands one-third more strength than the first, and requires pats to be $\frac{1}{2}$ in. thick instead of $\frac{1}{4}$ in., to be immersed immediately, and to remain in water seven days instead of two; the latter specification is undoubtedly better than the earlier one, and should ensure a very good Portland cement. Some manufacturers issue specifications of their cement, but as a rule the tests are not as stringent as would be required by many engineers. As good specimens of manufacturers' specifications we give the two put forth by Messrs. Charles Nelson & Co., Limited, of Stockton, Rugby.

SPECIFICATION No. 1.

Weight.—The cement to weigh not less than 112 lbs. per standard bushel.

Fineness.—To be ground so that not more than 5 per cent. residue shall be left on a sieve having 2,500 meshes to the square inch.

Tensile Strain.—The briquettes at seven days (during six of which they shall be immersed in water) shall not break at less than 450 lbs. on the square inch.

SPECIFICATION No. 2.

Weight.—The cement to weigh not less than 110 lbs. per square inch.

Fineness.—To be ground so that not more than 10 per cent. residue shall be left on a sieve having 2,500 meshes to the square inch.

Tensile Strain.—The briquettes at seven days (during six of which they shall be immersed in water) shall not break at less than 350 lbs. on the square inch.

It will be noticed that these specifications contain no test for soundness, and that the fineness is not up to the standard which many engineers now require. The fineness and tensile strength required by the first specification are, however, as high as need be demanded;

they are both better than those of Mr. Michele's specifications. If a cement be as finely-ground and as strong as Messrs. Nelson & Co.'s specification No. 1, and prove quite satisfactory when subjected to Mr. Michele's, or preferably Mr. Fatja's (see Chapter XI.) test for soundness, it will be good enough for all purposes. We may just add that Mr. Mann has suggested a specification for adhesive strength and fineness, but it has not come into general use.

Storing.—A clause is frequently inserted in specifications to the effect that the cement must be stored in bulk for a certain length of time in a suitable room. Some cements naturally require longer time for "purging" or air-slaking than others, as they contain more quick-lime; and some cements are purged to a considerable extent by the manufacturers before they are put into bags or barrels, and consequently may require little or no purging after their arrival at the works.

As we have already explained, Portland cement ought not to be used quite fresh, but opinions differ as to the length of time which it ought to be kept before being used. An extremely fine cement theoretically requires no exposure at all. A good cement should be sufficiently air-slaked by an exposure of two or three weeks. It is not enough to keep the cement in bags or barrels for that length of time, but it must be emptied upon a wooden or damp-proof concrete floor in a dry building, to a depth of 2 ft. or 3 ft., and allowed to remain there for the specified time. Even cement, which has been kept in bags for months, ought to be stored in bulk before being used. Great care must be exercised that the cement is not stored in a damp place, such as a cellar, or on a floor of flags or other material, between the joints of which or through which moisture can easily rise. Cement, which has been carefully packed in paper-lined barrels, and exported to a warm and moist country, has become lumpy after being kept for a year in the barrels, and the concrete made from it has proved a failure. There is a limit beyond which cement ought not to be kept, but it is impossible to lay down any hard-and-fast rule, as the limit will vary according to the nature of the cement and the manner of storage. The coarser the cement the longer the exposure which is required.

The effects of properly storing and air-slaking Portland cement are the retardation of the time of setting, increase of strength, the lessening or the total loss of any tendency to "blow," and the increase of bulk and consequent decrease of weight per bushel.

Where a test for soundness is specified, there is not so much necessity for specifying that the cement shall be stored in bulk for a certain time; because, if the cement be unsound when fresh, it of course falls short of the specification, and can, therefore, be rejected. The contractor will in this case be only too glad to render it sound if that can be done by storing it in bulk for a few weeks.

Where, however, no test for soundness is specified, the proper storage of the cement in bulk (not in bags or barrels) for some weeks, must be required. The contractor may try to evade this demand, but it must be insisted on, even when the cement has been obtained from a manufacturer of good reputation, whose name may have been mentioned in the specification. Otherwise, it will not be safe to use the cement.

GENERAL BUILDING NEWS.

CHURCH SCHOOLS, WILMSLOW, LANCASHIRE.—New Church Schools were opened at Wilmslow on the 13th inst. The new buildings have been erected in a populous part of the district, and have cost close upon 2,000. Mr. Lord, of Manchester, was the architect, and Mr. J. K. Coates, of Wilmslow, the contractor. All the rooms of the schools are fitted with noiseless block flooring.

PROPOSED PAROCHIAL OFFICES, AIRDRIE, LANCASHIRE.—On the 5th inst. the Airdrie Deaf Guild Court passed the plans for the erection of a suite of offices and Board-room for the New Monk-and-Parochial Board on a site contiguous to the Free High Church in North Bridge-street. The premises are to consist of the inspector's offices and offices for the collector of rates, as also a Board-room and other apartments in the upper story. The plans have been prepared by Mr. George Arthur, architect, Airdrie, and the estimated cost will be about 1,200.

NEW FREE CHURCH, COWDENBEATH, FIFE.—A new Free church was opened at Cowdenbeath on the 25th ult. The area of the church is seated for 449, while the end gallery will accommodate 150. In connexion with and behind the church there is to be a hall capable of seating upwards of 200

people. Vestry, lavatory, &c., have been provided. The front elevation is executed in dressed freestone, and the side and back walls in pressed brick. The seating is varnished yellow-pine, and the ceiling is finished in plaster with moulded ribs and cornice mouldings. The cost will be about 2,200. Mr. Andrew Scobie, Dunfermline, is the architect for the buildings.

WESLEYAN CHAPEL, FILLONGLEY, WARWICKSHIRE.—The memorial-stone of a new Wesleyan Chapel was laid at Fillongley, Warwickshire, on the 7th inst. The new buildings will include a chapel, school, and a caretaker's house. They will be of the Gothic style and built of red brick with stone dressings. On the left-hand angle of the chapel, which will accommodate 125 persons, will be a tower and spire 60 ft. high. On the same side will be the school, which will accommodate seventy-five persons. If needed for a large service the school and chapel can be thrown into one. The windows will be glazed with cathedral glass. A small recess will be left for the organ, and a minister's vestry will be provided at the back. The dimensions of the chapel will be—Height, 30 ft.; length, 33 ft.; and width, 24 ft. The school will be 18 ft. by 24 ft. By the door will be an entrance porch and lobby, and the school and chapel will be approached by the same entrance. The woodwork of the interior will be red deal, stained and varnished, and the roof principals will also be stained and varnished. The architect is Mr. Eben Harper and the builder Mr. W. Hopkins, both of Birmingham.

NEW BAPTIST CHAPEL AT CARDIFF.—On the 7th inst. a new Baptist chapel was opened at Cardiff. The new chapel fronts Pearl-street, and is of stone. Internally it is fitted with pitch-pine pews estimated to seat 340 persons. The chapel has been built by Mr. Augustus Lewis, of Cardiff, from plans prepared by Mr. Justin Hutchins, Cardiff, the cost being 1,265.

SUNDAY SCHOOL BUILDINGS, BURY ST. EDMUND'S.—On the 8th inst. the memorial-stone of the new Sunday Schools in connexion with the Baptist Chapel was laid at Bury St. Edmund's. The site of the schools is immediately opposite the Baptist Chapel in Garland-street. The new buildings will contain a room, which will be available either for the work of the Sunday School or as a hall for lectures or public meetings. It will be floored with solid pitch-pine flooring blocks, and will have an open-timber roof with dormer lights. There are also five class-rooms, four of which adjoin the main school and one over the entrance-porch. The buildings are being erected of brick, and will be covered in with slate roofs, and will be faced with Suffolk bricks and freestone dressings. It is proposed to warm the building on Grundy's warm-air system, and to ventilate it with automatic roof-exhaustible ventilator. The work is being carried out by Mr. J. Williams, of Bury St. Edmund's, under the direction of Mr. John E. Sears, of London.

PROPOSED RESTORATION OF EAST LUSTON CHURCH, NORFOLK.—According to the *Eastern Daily Press*, this church is about to be restored. It is a spacious building, consisting of an unusually large nave, chancel, south aisle, and porch. The tower contains one bell, and was formally surmounted by a spire. It also had a north aisle, which has been removed. The chancel was restored by the Ecclesiastical Commissioners about three years ago. The restoration about to be carried out from the designs and under the direction of Mr. A. S. Hewitt, of Great Yarmouth, will be the reseating and reforeshing of the nave, and the insertion of six new windows, the present ones being plain wooden frames.

SANITARY AND ENGINEERING NEWS.

LONG EATON WATER WORKS.—The important work on which the Long Eaton Local Board have been for over three years engaged, in endeavouring to obtain a pure and plentiful supply of water for their district, reached one of its final stages on Thursday last week, when the opening ceremony was performed at Stanton-by-Bridge. The town of Long Eaton is situated on the alluvium of the Trent Valley, close to the junction of the Rivers Erewash, Derwent, and Soar with the Trent, but all these streams, as well as their tributaries, are so polluted by sewage as to be quite out of the question for a town supply, whilst the subsoil is composed of the red marl of the Trias, interspersed with beds of gypsum, which yields a water of upward of 110 degrees of hardness. The works were, therefore, put down at Stanton-by-Bridge, in the parish of Melbourne, twelve miles distant from Long Eaton. A well, 11 ft. in diameter, was sunk in the Millstone Grit, and adits or tunnels, 6 ft. high by 5 ft. wide, were driven in various directions from the well for collecting the water, the total length of trias being 2,250 ft. From the commencement of the well-works to their completion in March, 1891, a period of eleven months, the pumping operations went on without cessation, the quantity pumped gradually increasing to 850,000 gallons per day. The machinery has been supplied under contract by Messrs. Tangyes, of Birmingham. It consists of two horizontal tandem compound steam engines, of the latest type, having every improve-

ment to secure economy of working. The high and low pressure cylinders are respectively 104 in. and 30 in. in diameter by 32-in. stroke, and each driven by spur mortice-gearing a pair of 14-in. bucket and plunger pumps, which raise the water to tanks outside the building, and two 10-in. double-acting force-pumps driven off the same cranks, which raise the water to the reservoir at Castle Donington, about five and a-half miles distant. Steam is supplied by two Lancashire boilers at a working pressure of 110 lbs., and the engines are capable of pumping 60,000 gallons of water per hour, which is 4,000 gallons in excess of the contract. The reservoir at Castle Donington is 212 ft. above the Market-place at Long Eaton, and has a capacity of 600,000 gallons. It is circular on plan, 75 ft. in diameter, and is constructed of brickwork in cement, surrounded by an envelope of puddle, and covered by brick arches, on which rests 2 ft. 6 in. of earth. One of the main objects in view in the design of the works has been the protection against fire of the large lake factories upon which the prosperity of the town depends, and for this purpose mains of large size have been carried round the factories, having upon them at frequent intervals 4-in. double outlet fire hydrants, under a constant pressure of 212 ft. of water, from which powerful jets can be thrown on to the roofs of the highest factories. The heavy expenditure entailed by the distance of the works from Long Eaton has been to some extent lightened by the fact that the mains pass through Melbourne, Kings Newton, and Castle Donington, which were in need of a water-supply, and agreements were made with the authorities of these towns to buy water in bulk from the Local Board. Melbourne is supplied direct from the pumping main whilst the machinery is running, and at other times from the reservoir at Castle Donington, and a separate main is direct from the reservoir to the water-supplies Castle Donington. The cast-iron mains, amounting to 3½ miles, have been supplied by the Stanton Iron Company, and the valves and fire apparatus by Messrs. J. Blakeborough & Sons, of Brighouse. The general contractors for Long Eaton and Castle Donington were Messrs. Price & Shardlow, of Nottingham, and for Melbourne and Kings Newton, Mr. G. P. Todd, of Derby. The amounts of the estimates sanctioned by the Local Government Board were for Long Eaton, 39,767; for Melbourne, 3,000; for Castle Donington, 2,000; and in each case the work has been executed within the estimated amounts. At the opening ceremony last week, the key of the engine house was presented by the Engineer to the Chairman of the Local Board (Mr. Joseph Orchard), who opened the door and started the No. 1 engine, the No. 2 engine being started by Mr. Thomas Smith, the oldest member of the Board.

PURIFICATION OF LANCASHIRE RIVERS.—The work of improving the condition of the Irwell and the Mersey is slowly but surely progressing, and several authorities have recently moved in the matter. Last week the Mossley Town Council had the question under consideration, and the Rivers Pollution Prevention Committee submitted their report. It was decided to engage Mr. Theo. S. McCollum, C.E., of Manchester, to prepare a scheme for the interception and purification of the sewage of the town, with the view of obtaining the early sanction of the Local Government Board for the necessary borrowing powers.

THE SEWAGE QUESTION IN THE WEST RIDING.—The Pontefract Rural Sanitary Authority have taken up in earnest the solution of the sanitary difficulties presented by their important district, which occupies a large section of the rapidly-advancing West Yorkshire coalfield. It is, in fact, due to this coalfield that increasing populations imperatively demand efficient drainage and water-supply. That the difficulties are not slight may be inferred from the fact that the rivers Aire and Calder, at a point below their confluence, intersect the Authority's district where the current is most sluggish, the river being dammed up with pools or navigable reaches four or five miles in length. Those acquainted with hydraulic questions will appreciate the importance of this obstacle, especially where scattered rural populations are to be drained. In March last the Authority received a scheme for the drainage and sewage treatment of Burton-Salmon—an entirely agricultural township—at a cost of 1,500. This scheme, which, small as it is, involves a pumping lift of some 10 or 12 ft., has been submitted to the township. In May, a scheme for the drainage of Beaherts township, at a cost of 2,700, was received, which also involved pumping; while, on the 10th inst., three alternative schemes were submitted for the drainage of Glasshoughton township, at a cost varying from 3,000 to 4,000. Two of these schemes are for combining respectively with the adjacent districts of Castleford and Whitroby, by discharging the bulk of the sewage into their respective sewer systems at a fixed charge per house; and the third is for dealing with the bulk of the sewage within and by the township itself. This self-contained scheme was recommended by the Authority's Engineer, Mr. Malcolm Paterson, of Bradford, as by far the most efficient and economical. In this case the three alternative schemes are by gravitation only, so far as the town-

ship itself is concerned, but the Castelford system, which also was designed in 1875 by Mr. Paterson, involves a lift of no less than 60 ft. Incidentally the Engineer's report it was mentioned that during the past year alone the population had increased 18 per cent., and this was attributed to the operation of the newly-completed water-supply. In all the above schemes it is proposed to treat the sewage on land, which is undoubtedly the best resource in rural districts.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOWS, LICHFIELD.—Two memorial windows have just been placed in the north aisle of St. Mary's Church, Lichfield. One is to the memory of Mrs. Scott, the wife of the Vicar, the Ven. Archdeacon Scott, and is the gift of the parishioners and citizens. The second is erected by Mr. Higgins, of Chicago, to the memory of Mr. and Mrs. W. T. Higgins, his parents. The first window represents the Adoration, and the second the Annunciation. Both are the work of Mr. Kemp, of London.

MEMORIAL WINDOW, ST. AGNES CHURCH, BRISTOL.—The dedication of the east window of St. Agnes Church, Bristol, which has been filled with stained glass, in recognition of the work done in the parish by the Rev. E. A. Fuller, took place on the 10th inst. The subject with which the window is filled is that of the Crucifixion, and the work has been carried out by Mr. W. O. Heming, of London.

STAINED GLASS WINDOW, SOUTH LEITH PARISH CHURCH.—The west window of South Leith Parish Church, Edinburgh, has just been filled with stained glass to the memory of the late Dr. James Struthers. The subject of the window is that of the two subjects—"Moses raising the brazen serpent," and "Christ healing the sick," each extend through the upper portion of three openings. Below are portrayed smaller subjects of the six acts of mercy. These are placed within ornament of an architectural character, and the tracery is filled with angels upon a foliated ground. The window is from the studio of Messrs. A. Ballantine & Gardner, Edinburgh.

FOREIGN AND COLONIAL.

FRANCE.—On account of the steady falling off of the pensioners of the Hotel des Invalides, the Government intends to petition Parliament to give up the whole Hotel to different public works, civil and military, and give the low remaining "Invalides" a retiring pension, as has been done at Greenwich. There is also a talk of transferring the Minister of Finance from the Louvre to the Invalides, and also of increasing in no small degree the galleries of the National Museum. If this project is carried out, the church where Napoleon's remains lie will be turned into a sort of Military Pantheon, devoted to the illustrious generals who have died in the service of France. Models of all the principal French monuments which are in the Trocadéro Museum are being made for the Chicago Exhibition.—The destruction of the Palace of St. Cloud is going on rapidly. The State has retained the twelve statues decorating the facade of the Court, three only of which are intact. It is said that the Duo de Nemours has bought two frontals, on which are the arms of the Orleans family. The large balcony in wrought iron, which overlooks the private garden, has been bought by the Count Pozzo di Borgo, who has already rebuilt a part of the gardens in Corsica. The sculptured chandeliers still to be sold. A monumental Mairie is to be built at Levallois Perret, near Paris; it is to be surrounded by a square, with fountains.—On September 22 the monument to the painter Millet (whose picture of the "Angelus" has become so famous) is to be inaugurated at Cherbourg. The monument consists of a granite stele on which stands the bust of the artist, carved by Chapu. At the base of the monument are two subjects in bronze by M. Bouteiller, pupil of M. Falguière; on one side, the attributes of Painting; on the other a peasant with a child in her arms, who offers a palm to the artist.—The works for the installation of the new Hotel des Postes et Télégraphes, at Bordeaux, have just been begun. The Hotel occupies the site of the old Hotel des Monnaies, which was built in 1757 by the architect Portier, and which is a fine specimen of the architecture of the eighteenth century.—The Baron Alphonse de Rothschild has just presented to the Montpelier Museum a frame containing forty-seven medals by M. Jules Chaplain, Member of the Institute.—The new public hall of the Montpelier Museum has just been opened to the public. It is to be specially devoted to the cartoons and designs of Alexandre Cabanel, whose bust, by M. Paul Dubois, stands in the centre of the hall.—M. Estrade, a civil engineer, and left of the Ecole Centrale, who has lately died, has left all his immense fortune to the Institute of France.

The engineers of the Ville de Paris are contemplating a project of using the waters of the pretty little river "Long" which flows into the Seine at Moret, for the supply of the capital.—During some alterations in the roads at Lyons the foundations of the Church of St. Etienne, in the Rue St. Etienne and d'Estrées, have been brought

to light. It had been demolished in 1797. Several pieces of sculpture have been found, amongst them a monumental statue in coloured stone, representing a cavallerie in colour of mail, with a disk by his side, in order to give some employment to the workmen of Havre, who have been thrown out of work by the cholera epidemic, the Minister of Public Works has ordered the immediate commencement of the line, which is to connect Havre and Dieppe.—The centenary of the proclamation of the first Republic will be celebrated by a fête on September 22. The organisation of the cortege has been entrusted to M. Bouvard, the now Inspector of Architecture of the Ville de Paris.—A committee has been formed in Paris to erect a statue to the poet Charles Baudelaire. The sculptor Rodin is to make the monument.—At Meudon-Bellevue (near Paris) a rope railway is in course of construction, to go from the Seine to the Terrasse de Meudon. It will be opened next spring.—A competition between architects and sculptors has been opened at Dunkerque (Nord) for the erection of a monument commemorating the siege of the town in 1793.—The Municipal Administration of Paris is building a new hospital on the Place du Danube (Nineteenth Arrondissement), which is to receive the overflow of all the other hospitals in Paris.

BUDAPEST.—A competition has been opened for the design of a new central market-hall, which is to have some 500 or 600 stalls. The competition is an "international" one, but unfortunately all nomenclature has to be in Hungarian. There will be fifteen jurymen acting as assessors, and of these we would mention the City Architects of Berlin and Leipzig, a French engineer, and a German mart expert in market buildings, and two Hungarians. Five premiums are to be given, three of 2,000 florins and two of 1,000 florins. The author of the design considered best will have the commission to carry out the building. There is to be a public exhibition of all drawings sent in.

BULGARIA.—At Philippopolis the first Bulgarian National Exhibition has been opened. The site is outside the town, and has as superficial area of some 100,000 square metres. According to an Austrian contemporary the provisional buildings put up, consisting of a dozen main pavilions and forty-five minor ones, make a very good show as far as construction and architectural decoration is concerned. They are said to have a *bondrée* provisional nature, the constructional parts being of timber, and the surfaces canvas painted in various designs.

ST. PETERSBURG.—There is to be a Hygienic Exhibition in the capital next spring, and it is said that the Czar wishes to see special attention paid to the divisions devoted to practical sanitation.

BERLIN.—When the German Emperor decided to let the Berlin International Exhibition question drop, several competitions had already been opened with the purpose of obtaining proposals as to site and the laying out of the grounds. The promoter of the most important of these competitions was the "Vereinigung Berliner Architekten." The committee managing this competition has now made known to intending candidates for their prize that they expect the Emperor's sanction not to have any effect on the work, that the building in day is to be a fortnight later than first intended, and that the promiated design will serve as a most valuable basis for the preparation of a new scheme of the exhibition, which is to be taken in hand as soon as practicable.—The amalgamated societies of architects and civil engineers can this year boast of having 7,734 members, belonging to thirty different societies, the senior of "Architekten Verein" at Berlin, holds the list of societies with 1,849 members. At the special business meetings held at Leipzig, prior to the gathering, twenty-six societies were represented by fifty official delegates. Herr "Baurath" Hinckeldeyn, of Berlin, was elected to hold the chair for 1893, and "Stadtbaumeister" Pinkenburg will act as hon. secretary. Among the subjects to be taken in hand next year will be the framing of a new set of general regulations for competitions. Of the subjects which are shortly to be treated, we may mention (1) the diminution of smoke and soot in towns, (2) the qualities of so-called "fireproof" materials, (3) the advisability of using the gas-pipes of a house as lightning conductors.—According to a local paper at Götting it now appears that if no unexpected hindrance takes place the North Sea-Baltic Canal can be opened in the autumn of 1895. Two million cubic metres of ground are being moved every month, and the stone embankments and bridges are progressing more favourably than was expected. It has now been determined that the canal is to be lighted by electricity, to facilitate the working of night traffic.

DENMARK.—The Danish Rigsraad has refused to make any grant towards the rebuilding of the celebrated historical Christiansborg Palace, destroyed by fire some years ago. The Danish Government has appointed a commission to consider the great building schemes now before it respecting Copenhagen. The list is as follows:—Rebuilding of Christiansborg Palace, a new House of Parliament, rebuilding of the Prince's Palace, new central railway station, new barracks for the Foot Guards, removal of the arsenal, new barracks for the Life Guards, new buildings for the Royal Archives and the National Library, a new observatory, enlarge-

ment or rebuilding of the Theatre Royal, and two gymnastic establishments for teachers and twenty gymnastic students. Moreover, the Municipality of Copenhagen has under consideration plans for the building of a new Town-hall.—A protracted war is raging over the so-called restoration of the old Gothic Mariæ Cathedral. In 1864 the interior and exterior were restored by the well-known architect and archaeologist, Professor Høyer, the interior being painted a light yellow, with red for the bases of column, the arches of the dome, &c., and the church authorities now desire to whitewash the whole interior. Against this the Mariæ citizens strongly protest, and a commission has been appointed to consider the question. The excavations of the ruins of the historical Vordingborg Castle are being continued, but as yet very little of interest has come to light, but discoveries of considerable archaeological interest are anticipated.—During the past summer the frescos in eight village churches in Jutland have been restored. They all date from the early part of the Christian era.—At the General Meeting of the Technical Society of Copenhagen, the representative society of Danish architects and engineers, it was announced that the members number 578. The society had offered its annual prize of 500 kr. for the best essay "On Workmen's Dwellings Abroad and at Home with Technical and Hygienic Rules for the erection of such," but none worthy of the prize had been received. The Society had, therefore, commissioned Herr Olaf Schmidt, architect, to prepare the essay.—The work on the new great harbour in course of construction at Copenhagen is being pushed on with great vigour.

STOCKHOLM AND NORWAY.—The present and last year has witnessed a complete standstill in building operations in Stockholm, being, no doubt, a reaction caused by over-speculation in preceding years. The number of dwellings at present unoccupied in Stockholm is unprecedentedly large.—In consequence of the great number of falls of roof scaffolding in Stockholm of late, the City Architect and the Board of Works have proposed to the Municipal Authorities the adoption of a series of more stringent rules in connexion with such structures.—Prof. Julius Kronberg, the celebrated Swedish painter, who has recently finished the huge frescoes on the grand staircase of the royal palace, has been commissioned by King Oscar to continue the work up the second stairs.—The granite quarries of the Kullgren Company have been purchased by a German firm. They comprise extensive areas of red and black granite in the south of Sweden.—The new Gothenburg waterworks are approaching completion, and it is expected that they may be taken into use before the coming of winter. They will furnish the city with a copious and excellent supply of water.—We referred recently to a project for supplying the city of Gothenburg and district with electricity for motive and lighting purposes from the great Trollbitta Falls, and from a canvass made it appears that the demand will amount to 5,262 horse-power, for 3,395 glow and 178 arc lamps. The undertaking is, therefore, secured.—Several new monumental public buildings are to be erected in Christiania, the most important being the new Government offices, which are to cost about 100,000, and an Historical Museum to cost about 35,500. Both buildings are to be ready in 1896. A third building is the new Customs House, upon which work is now actively progressing.—The General Post-office is also being rebuilt at a cost of 17,000, and will be ready next summer. The new building will be heated by steam and lighted by electricity. The architect is Herr Nordan.—Another striking building in the Norwegian capital is the Volman Bazar, erected on the site of the one burned down last spring. It is a handsome structure of four stories, in the construction of which variegated kinds of Norwegian granite,—grey, red, black, &c., have been introduced most effectively. It is heated by steam and lighted by electricity. The cost of the building is 12,500, and the heating and lighting apparatus 2,500.—The Christiania Cement Company,—the only one in Norway,—has been transferred to a syndicate for a sum of 21,000.—The Norwegian Association of Engineers and Architects has presented an address to the Government urging the employment of professionals only on matters in the case of questions of a technical nature.

THE DANUBE.—The great works of regulating the Danube at the so-called "Iron Gate" by Orsova are rapidly progressing. Extensive mining with dynamite has taken place, including eleven "monster" blasts. The quantity of rock removed from the watercourse is about 1,000 cubic metres a day. The hands engaged upon the work number over a thousand. The work is to be continued unabated during the winter.

RUSSIA.—A large new harbour has just been completed at Libau.—The Finnish Government has voted a sum of 12,200, for completing the harbour works now carried out in the port of Hangö, in the Finnish Gulf, and the erection of a Customs' depot.—The Russian department of communication has prepared plans for a canal between the rivers Dnieper and Dvina. Its cost is estimated at about 650,000. This waterway would establish connexion between the Baltic and the Black Sea,

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered. Includes entry for Technical Schools.

CONTRACTS.

Table with 5 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Traders to be delivered. Lists various construction contracts.

CONTRACTS.—Continued.

Continuation of Contracts table with 5 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Traders to be delivered.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be received. Lists sanitary inspector and assistant surveyor positions.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv., vi., vii., viii. Public Appointments, p. xviii.

and therefore because of great commercial importance.—The Moscow Section of the Imperial Technical Society has obtained permission to hold an exhibition of fireproof building materials in that city next spring, to be open six months. There will also be a show of fire-extinguishing apparatus.

made by his predecessors in office regarding the abolition of sub-contracting on Government contracts.—This amendment was accepted by the meeting, and the entire resolution, as amended, was then put to the meeting, and agreed to.

MISCELLANEOUS.

SUB-CONTRACTING AND THE TRADES UNION CONGRESS.—At the meeting held on the 7th inst. of the Trades Union Congress, which has been holding its meetings this year in the City Hall, Glasgow, Mr. Harvey submitted the following resolution:—"That the system of sub-contracting allowed and sanctioned by the Government on their works is in direct violation of their promises as given in the House of Commons, and that our delegate be instructed to press the matter in Congress with a view of giving such a distinct branch of faith into the Parliamentary Committee's hands to deal with." In supporting the resolution, Mr. Harvey adduced a number of instances in which Government work had been carried through by sub-contractors, and carried through in the most scandalous manner. These sub-contracts were recognised by Government officials. In the case of a certain Post-office, the First Commissioner of Works was appealed to on the subject. He appointed an expert, who examined the work and condemned the greater part of it, yet he (Mr. Harvey) was informed that the work remained unaltered. Then, again, in the case of certain new Police-courts, a communication had been received from the First Commissioner of Works stating that the wages paid were 3d., 3d., and 10d. an hour. There was, however, evidence to prove that such wages were never paid, and that the conditions of the work were nothing less than swindling. He hoped the Congress would instruct the Parliamentary Committee to adopt such measures as would prevent the recurrence of sub-contracting in connexion with Government works.—Mr. Gibbs, London, seconded the amendment.—Mr. P. J. King proposed the addition to the resolution of the following words:—"And that where sub-contracting, which we emphatically condemn, is allowed either in public or private works, the sub-contractor be called upon to give security so as to protect the employes in case of accident, as provided in the Employers' Liability Act."—Mr. John Ward, London, seconded the proposed addition. The Employers' Liability Act, as it stood, was a dead letter to a man who got injured under such conditions. The sub-contractor should be required to give security that he was able to pay legitimate compensation that might be claimed from him in respect of injury to his workmen.—Mr. King's amendment was then put to the meeting, and carried by a large majority. It was added to the resolution.—Mr. Ross, Manchester, moved, as an additional amendment, that after the word "works" there be added the following clause:—"Or in issuing Government orders to sub-contractors." The amendment, having been seconded, was adopted.—Mr. M'Bean, London, moved, as a further amendment, that at the end of the resolution there be added the following clause:—"And that the committee be likewise instructed to wait, by deputation, upon the First Lord of the Treasury, to remind him of the promise

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The Council of the Birmingham Architectural Association have, we understand, recently issued circulars to the members intimating that they have completed arrangements with the School of Art by which the educational work of the Association will be brought into connexion with the School in such a manner as will, it is hoped, give greater facilities for the study of architecture. The scheme is one by which the School of Art and the Architectural Association combine to undertake a special course of architectural classes and lectures for the purpose of giving a student in four years all that he needs in the early years of his career, the historical subjects being dealt with at the School of Art, and the technical subjects at the Association meetings. In order to make the course as thorough as possible, special lectures have been arranged for in addition to the classes already held at the School of Art, and the Association meetings have been rearranged and strengthened as far as possible.

PLUMBERS' REGISTRATION MOVEMENT.—The third annual Congress of Scottish District Councils for the National Registration of Plumbers has just been held in the Town Hall, Dundee. Lord Provost Mathewson presided, and there was a very good attendance of representatives of the principal municipal, sanitary and educational authorities of Scotland, in addition to a very large number of representative master and operative plumbers, architects, sanitarians, &c., from all the chief cities and towns of Scotland. Councillor Corrie, Dundee, moved that Municipal and County Health Authorities should be recommended to frame and enforce by laws under the Public Health Acts for the better construction of plumber work in all sanitary appliances; that, where practicable, they should consult the Central or District Council for the National Registration of Plumbers in framing such by-laws; and that, wherever possible, a qualified registered plumber should be appointed to supervise the carrying out of such work. Bailie Stephenson, Dundee, seconded, and after some discussion the resolution was unanimously adopted. Mr. John Crispon, Town Clerk, Dundee, moved, "That in the opinion of the Congress it is important that the resolutions adopted by the Congress, and the views expressed by the representatives of the District Councils embodying these views should be presented as a memorial to Parliament; and further, that the members of the Congress should urge upon their several representatives in Parliament the importance of their supporting the Registration Bill and expediting its passing into law." This resolution having been supported by Mr. W. P. Buchan, master plumber, of Glasgow, and others, was carried unanimously.

EXTENSION OF THE ABERDEEN GAS WORKS.—Extensive additions to the Aberdeen Gas Works, estimated to cost 80,000l., were sanctioned by the Aberdeen Town Council on the 5th inst. In order that the works may be carried out applications will be made to Parliament in the evening session for a

Bill to authorise the Council to borrow an additional sum of 90,000l. in connexion with the gas undertaking. The Council had before it reports on the proposed works by Mr. Samuel Stewart, Greenock, and Mr. Alexander Smith, the Aberdeen gas manager. According to these reports the bench containing eighty retorts, heated by the open furnaces, will be reconstructed, so as to contain 128 retorts on the regenerative system. This alteration will give retort power for about four years. The present gasholder capacity is 2,100,000 cubic ft., while the largest daily consumption last winter was 2,900,000 cubic ft., showing already a deficiency in storage power of 800,000 cubic ft., and to remedy this there will be erected an additional gasholder of at least 3,000,000 cubic ft. capacity. Another retort-house, to contain 224 retorts, will be built alongside the present one; and an additional purifier-house, scrubbers, and condensers will be built as required. When these extensions are carried out, the gas-producing power at the works will be increased from 384 to 656 retorts.

THE ABERDEEN ELECTRIC LIGHTING SCHEME.—The Town Council of Aberdeen discussed on the 5th inst. the recommendation of the Gas Committee that the Corporation should proceed with the lighting of the eastern district of the city at an estimated cost of 24,000l. Professor Kennedy, of London, who had been consulted, reported that the compulsory area should include Castle-street, Union-street, as far west as Bon-Accord-street, Market-street, Broad-street, St. Nicholas-street, the southernmost block of George-street, Schoolhill, and the circuit round the new road by the Free Library, and down Union-terrace. About 10,000 lamps of 8-candle power would be installed, of which about 7,000 would be in the eastern and 3,000 in the western district. The central station will be located in Cotton-street. On a division it was resolved by 24 to 5 to proceed with the lighting of the eastern district as indicated in the report, and it was remitted to the Gas Committee to have the scheme carried into effect.

THE ENGLISH IRON TRADE.—Little change has occurred in the English iron market. The general tone of business at the various pig-iron centres is quiet; but prices on the whole are maintained. In the Cleveland district, however, further reductions are recorded. In the finished-iron branch prices prevail. Back sheets and hoops are 2s. 6d. per ton lower. In the tin-plate trade matters continue in a depressed state. In the tin-plate and sheet-iron, and value remain unchanged; but in Scotland sales of ship-plates are reported at 5l. 7s. 6d. net, probably the lowest price recorded. Engineers and shipbuilders are in receipt of few new orders. The coal trade is still somewhat inactive.—Iron. GLOUCESTER CATHEDRAL CLOCK AND CHIMES.—The old clock which has been in the tower of Gloucester Cathedral for several hundred years, has been taken out and replaced by a large clock chiming the Westminster quarters on four bells, and striking the hours on the large bell Peter, the hammer of which has been made four times as heavy as it originally was, thus bringing out a full tone from the bell. The pendulum is 14 ft. long, is about 300 lbs. in weight, beats once in two seconds, and is compensated for atmospheric influences. All the wheels are of best hard gun-metal, and the teeth cut of the solid. It is fitted with a maintaining

power to keep the clock in action during winding. The main wheel is fitted with powerful iron cam for direct action in lifting the heavy hammer of the large bell. The movement is mounted on a horizontal iron frame with plated bearings, and all the bushes are screwed and bolted on to the frame, so that any part can easily be removed for repairs or cleaning without taking the whole clock to pieces. This clock when settled down is guaranteed to maintain true time with less variations than fifteen seconds per month. The carillon or chiming-machine was made about the fourteenth century, and is a marvel of mechanical ingenuity for that age. It has been entirely reconstructed, with all improvements up to date added to it. It is set in action by the clock, and chimes the same four times it has done since 1680 on a peal of eight bells and the large bell Peter. There is a register in existence notifying that it was repaired by Thomas Loveday, bell-founder, in 1577, and four of the peal of eight bells were cast by Master John, of Gloucester, in 1345. The old oak frame (which somewhat resembles an ancient four-post bedstead) has been replaced by a new one made of steel. The whole of this work has been carried out by Messrs. Sainsbury Bros., of Walthamstow.

CAPITAL AND LABOUR.

THE CARPENTERS' STRIKE IN BELFAST.—The dispute which has been in existence for some time between the carpenters and the master builders of Belfast, was, as *The Belfast News Letter*, settled on the 9th inst. At the recent interview between the employers and a deputation on behalf of the carpenters, an increase of a farthing was offered, bringing the wages up to 7½d. an hour, and the men have agreed to accept these terms, the question not to be raised again until 1894. The original demand was 8d. an hour. It should be stated that the settling down is at present confined to the carpenters, and that the position of the plasterers is not affected.

END OF THE BRICKLAYERS' STRIKE AT BROMLEY.—After a strike which has lasted over five weeks, the bricklayers in Bromley returned to work on Monday, having obtained their request for 3d. per hour extra.

MEETINGS.

- SATURDAY, SEPTEMBER 17.
 - Architectural Association.—Visit to Lonsley Park and Guildford. Train leaves Waterloo at 1.55 p.m.
 - Glasgow Architectural Association.—Visit to Bardowie Castle and Muggeridge Castle.
- TUESDAY, SEPTEMBER 20.
 - Glasgow Architectural Association.—Mr. Campbell Douglas on "A Tour in Spain and Portugal." 8 p.m.
- WEDNESDAY, SEPTEMBER 21.
 - Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting, 8.30 p.m.
- SATURDAY, SEPTEMBER 24.
 - Liverpool Engineering Society.—Visit to the Liverpool Overhead Railway Works, and the Liverpool Hydraulic Power Company's Works.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

13,010.—TILES: *H. L. Doulan and J. M. Carr.*—This patent relates to an improved form of tile for covering the roofs of other various methods of fixing the same. The tiles are made of any suitable material, and of any convenient size,—say 9 in. square,—and may be of any required curved or straight form on the outside face, with any desired ornaments or patterns impressed, raised, or otherwise produced on the surface. On the back of the tile a dovetailed groove or recess is formed in its thickest part, and a dovetailed projection on its thinnest part, those dovetailed parts occupying about half of the back surface of the tile, the remainder being a flat plane, or it may be a curved surface for special positions. At the thick edge of the tile a shoulder or a rebate sinking may be formed to receive the thin edge of the next tile. The mode of covering the roof and fixing the tiles are fully set out in the specification.

14,000.—CISTERNS: *Hy. Bartlett.*—This invention refers to siphon-flushing cisterns for water-closets, urinals, &c. The cistern is partitioned off into two compartments, a larger or main compartment and a smaller one. At the base of the partition are inlets at intervals to afford access to the water in the smaller compartment. The siphon, which is obviously open at its top, is cast in connexion with two, three, or four additional pipes, the casting surrounding and forming the siphon and the inlets, and is cast longer at its base than the pipes or cylinders at each side of it (which do not touch the floor of the cistern), so that it may be fitted to bearing on the sides of the main chamber, and thence connected to the external supply leading to the water-closet or other basin. A plate covers the area of the main compartment of the cistern. In order to lift the plate two perpendicular rods are attached, one on each side, in the direction of its width, the rods being secured by screw-nuts or other suitable means. Connected to the upper end of the rods is a lever having a hook and chain purpose for holding the rods up, and chain or otherwise. By the raising or lowering of the plate by means of the lever the water in the main compartment will be admitted and forced up the pipes or cylinders on each side of the stand pipe or siphon, and over the top of and down the same, causing thus a vacuum to be formed by reason of the displaced air, so that impregnation is started, and water will cease until the whole of the water in the two compartments is exhausted, when the cistern refills in the usual way.

15,636.—BRICK AND TILE MAKING: *E. P. Bestin.*—The object of this invention is to construct a rotary siphon on each side of the stand pipe or siphon, and machine, which shall mould, press, and emboss bricks, tiles, or other like articles, and also punch and camber

such articles when required. For this purpose, the clay, or plastic material, is fed from a pug-mill, roller-machinery, or other equivalent means into the rotary machine and pressing machine, which consists of two adjustable wheels, or rollers, one or both of which may be flanged and mounted in a strong frame, one or both being so constructed as to revolve in opposite directions, and a series of dies with a movable division between each die. When these rollers are rotated, and the clay or other plastic material passed between them, each die in succession receives a portion of the material, moulds it into a press, and embosses the same, and delivers the article so formed on the opposite side of the machine. In the case of articles requiring to be curved or cambered, the articles, movable punches are attached to each die, rollers, in such a position as to give the required shape, the rollers being actuated by the friction of the article passing it, or by suitable mechanism. For punching articles, movable punches are attached to each die, actuated by suitable mechanism to remove them out of the way when the article is being delivered.

11,233.—SLIDING WINDOWS: *C. H. Maister and A. Bell.*—This invention has for its object improvements in apparatus for preventing the vibration or rattling of sliding windows. A disc (preferably of metal) is employed, flat on one side, but on the other side tapered for tapering downward from the centre, so as to form a kind of circular wedge, which is held in the required position within a cover or pocket fastened to the window-sash, the arrangement being such that the lower wedge of its own gravity falls or moves sideways into or between the sash and its guide frame, and so takes up any slack between them.

11,813.—WATER-CLOSETS: *S. E. Dix.*—This improvement consists in the construction of a separate syphon covering for a water-closet pan or trap, whereby an existing water-closet on any common pan may take the place of a pedestal closet without using the expensive pan for that purpose. The last part of the trap may, if required, be packed as a preventive against frost.

NEW APPLICATIONS FOR LETTERS PATENT.

August 29.—15,455, W. Gibson, a Tongue and Groove Jointed Roof-tile, Floor-tile, Wall Coping, Drain-pipes, Rain-water Pipes, and applicable to all joints in any kind of material. —15,473, J. Craig and R. Highest, sen., Syphon Discharge. —15,531, J. Wilmut, Fireproof Lathing. —15,518, W. Steel and H. Braham, Sash Fasteners. —15,602, G. Gent, Disinfecting Means for Water-closets, Drain-pipes, &c.

August 31.—15,593, J. Cornelius, Sower Ventilating-shaft, or Chimneys, &c.—15,618, R. Holt, Sash Fastener. —15,624, A. Jones, Window-sash Fasteners. —15,626, W. Glazier and J. Malvan, Hinges for Folding Doors, &c.—15,631, H. Palmer-Entry, Route of Horticultural and other Buildings.

September 1.—15,601, R. Cochrane, Mosaic, Parquet, and similar Ornamental Work. —15,715, S. Kirk, Windows with Combined Sliding and Hinged Sashes. —September 2.—15,770, E. Hargreaves and others, Gulleys and Traps for Sanitary Purposes. —15,794, L. Howard and others, Self-closing Regulating Valves for Gas Admittance to Water, &c. Water-closets, Urinals, Lavatories, &c.—15,800, A. Gist, the Climax Drain and Pipe Testing Plug.

September 3.—15,824, W. Middleton, Cabinets, &c.—15,838, S. Houghton, Slake Punch. —15,850, W. Hutton, Hydraulic Lifting Jacks and Hydraulic Rams.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,410, J. Campbell and C. Cameron, Safety Door or Gate for Hoists or Lifts.—11,412, J. Campbell and C. Cameron, Safety Gate for Hoists.—12,746, W. Freeman, Automatic Flushing Apparatus for Houses, Drains, Sewers, Urinals, Water-closets, &c.—13,357, W. Downes, Siphon. —13,421, H. Bueley, Spirit Levels, &c.—13,809, H. Cunliffe and H. Michaux, Metal Laths and Corrugated Iron for Buildings and Structures, and for Roofing and Constructive Purposes.—13,856, G. Binawan and J. G. Guardia, Electric Belts.—14,181, H. Hately, Decorating Chandellers, Gasaliers, Lamps, &c.—14,923, T. Kaye, Fastening for Drains, Pipes, and other Iron, Wires or Kilns for Burning and Drying Bricks, Tiles, and similar articles of earthenware.

COMPLETE SPECIFICATIONS ACCEPTED.

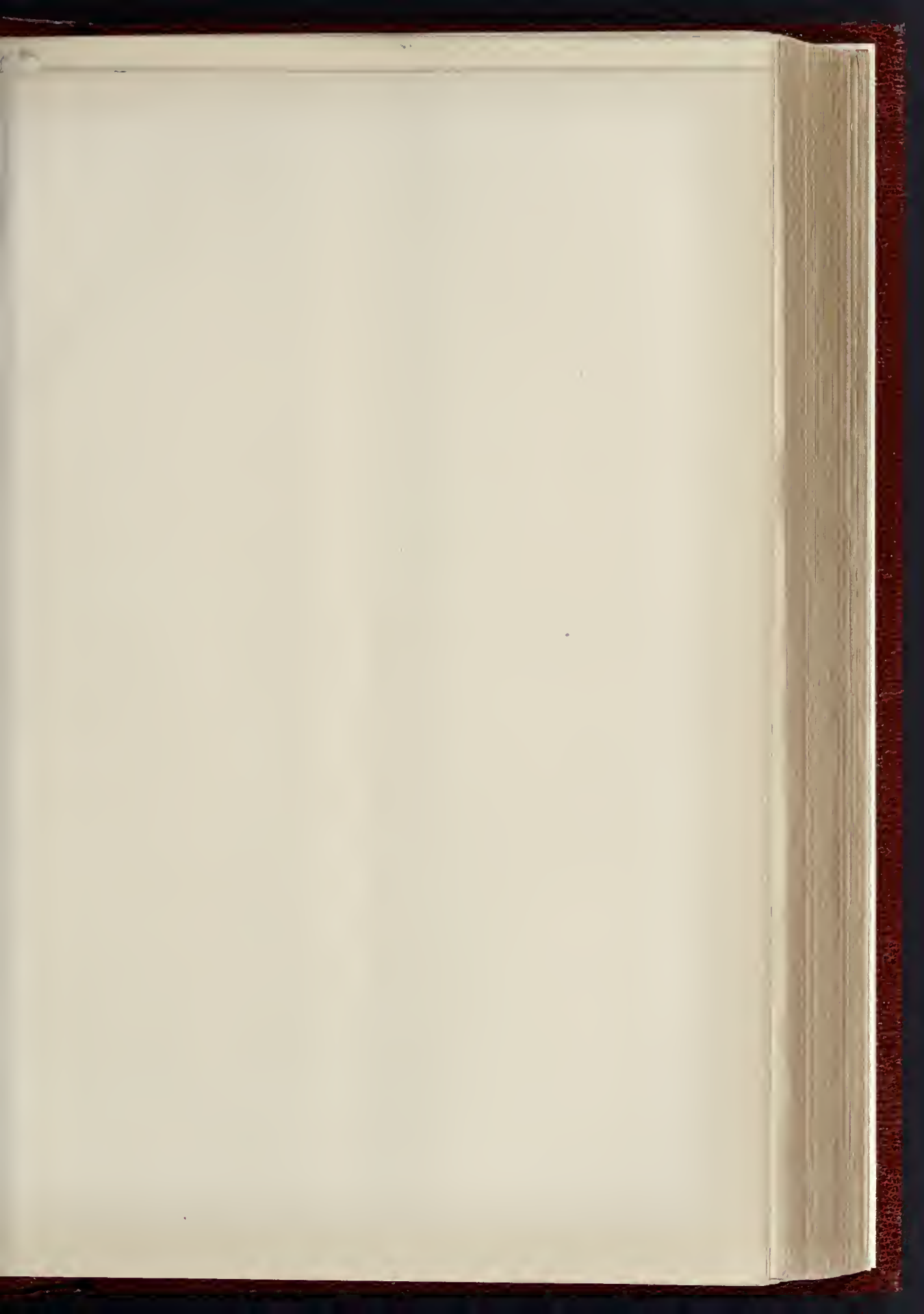
(Open to Opposition for Two Months.)

14,655, W. Horn, Saw Setting and Filing Device.—15,553, T. Arnold, Utilization of Slag for the Manufacture of Blocks, Slabs, Drain-pipes, or other moulded articles.—15,735, F. Moore, Paint Turner.—3,410, G. Mesger, Construction and Fittings to Window-sashes.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 7.—By *E. E. Croucher & Co.*: Freehold building estate of 1a, 27, 2 p., Granville-rd., Broadstairs, 1,450*l.*; 4 Wrotham Villa, Ramsgate-rd., and cottage on 1,450*l.*; 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13, Funnell-rd., 1, 8, 10, 10,562*l.*; 5 and 6, Wrotham-cres., 1, r. 65*l.*; 933*l.*; 1, 3, 10, and 11, Wrotham-cres., 1, r. 900*l.*; 1,075*l.*; a plot of 1 a, land, Wrotham-cres., 620*l.*; 1 to 4, Buckingham-st., 1, r. 53*l.*; 44, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 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BY ABBEY YORKSHIRE RESTORATION OF OLD GLASS OF GREAT EAST



The Builder.

VOL. LXVIII. No. 2850.

SEPTEMBER 24, 1892.

ILLUSTRATIONS.

Restoration of Great East Window, Selby Abbey.—Executed, according to the Original Design, by Messrs. Ward & Hughes. *Extra Large Ink Photo.*
The Hall, South Lytchett Manor, near Poole.—Mr. W. D. Caroe, M.A., Architect *Double-Page Photo-Litho.*
Studio, Melbury-road; and "Mark Ash," Abinger.—Mr. John Belcher, F.R.I.B.A., Architect *Double-Page Ink Photo.*

Blocks in Text.

Plan, Studio, Melbury-road Page 244 | Ground Plan, "Mark Ash," Abinger Page 245
Old Clergy House, Alfriston Page 246

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The Curriculum of the Architectural Association for the Session 1892-93.



AFTER the stormy debates which marked the close of the last session of the Architectural Association, we turn with some interest to a perusal of the curriculum prepared by the committee for the coming winter's work, and we are pleased to note that the victorious majority have evidently shown studied moderation in the use of the power given them at the election of officers. There is no longer any ground for even the most captious critic to stigmatise the Association as a "forcing-ground" for the Institute, as direct reference to the subjects of the Institute examinations and direct instigation to members of the Association to prepare for those examinations are alike carefully eliminated from the pages of the curriculum just issued. At the same time, no member of the Association who desires to prepare for the Institute examinations can say that he is unable to obtain the instruction he requires within the walls of the society to which he belongs.

The ground now taken by the governing body of the Association evidently is that it is their duty to provide for the architectural student the best education in their power, and that, when he has availed himself of that education, he will be qualified to pass the examinations of the Institute, and it rests entirely with himself to decide whether he will submit himself to that ordeal or not. The subjects required for the examinations are still to be found in the curriculum, and adequate tuition is provided in those subjects, as in others which are considered desirable for the education of an architect.

So much concession having been made to those who think with the party in the profession whom we have learnt to call "the memorialists," we are somewhat surprised to see that amongst the names of those eminent architects who "have kindly consented to act as visitors at the meetings in the studio for the criticism of drawings," only one name,

that of Mr. Basil Champneys, stands as representing the non-members of the Institute, and we think that those who, in advocating the views of "the memorialists," virtually pledged the support of some eminent outsiders, should either redeem those pledges or give to the members of the Association some good reason for their failure to make good their promises.

The need for the elasticity of arrangement and freedom of individual action which have always been amongst the most valued characteristics of Association work in the past has, doubtless, led to the most prominent alteration in the arrangement of the curriculum. Instead of dividing the subject into four "years," with the implied condition that each of these formed a rigid and inflexible part of the whole, we find that the principal subjects, or those which the committee regard as such, are grouped into four "divisions" and the remainder classed as "extra subjects." Further, this arrangement is made still more elastic by the provision that for the reduced inclusive fee of five guineas a student may, if he be so minded, choose one subject out of each of the four "divisions" and one "extra subject." We cannot but regard this latitude offered to the individual student as an admirable preventive of any undue "academic" strait-lacing, which some architects profess to regard as inseparable from organised architectural education. A student may now, if he wishes it, follow the curriculum in its four "divisions" in regular order, or he may select those subjects in which he feels most need of instruction or for which he has the greater preference. He may even, if he be so disposed, attend one only of the classes, or, on the other hand, may, subject to the exigencies of the timetable, attend the whole.

Another alteration of some importance, and one that has been wisely made, in view of the conditions under which English architectural students work, is the reduction of the time allotted each evening to lectures and classes. After a young man has been engaged in an office all day, and, presumably, diligently engaged, it is too much to expect that he will be physically and mentally capable of paying that attention which the improved quality of the instruction now given de-

mands, for so long a time as three hours. It is, therefore, a wise course on the part of the committee to limit the period of study to two hours in lectures and classes, and we doubt not that it will be found that students learn as much—that is, assimilate and retain as much—in two hours as in three. In the studio we note that the time still remains three hours, which is reasonable, as the attention is less tensely exerted in studio work than in lecture or class, and, as we know from the experience of Academy students, a shorter evening than three hours is of very little use for the study of drawing and design.

We see that, as a rule, the evenings allotted to each subject now follow each other in quick succession, so that a student will, ordinarily, be devoting his attention to one subject at a time instead of having several in hand at once. This is directly contrary to what we remember as the conclusion to which the Education Committee, who formulated the new scheme, declared their adhesion, but we can readily understand that however desirable it may be, in ordinary schools and colleges, for students to study several subjects at once, it is otherwise with a course intended for architectural students who are devoting, so to speak, only their leisure time to attendance at lectures and classes. Dealing with each separate subject in a series of meetings at short intervals is, moreover, especially suited to the student who wishes to individualise his work and to take up one or two subjects only; and, as we have already pointed out, this type of student is apparently one that the committee wish to meet in every way. We think, however, that this rapid succession of meetings has, in some cases, been rather overdone, and that a longer interval would enable students to make better preparation for their class work than is now possible. We fear that the new arrangement will rather tend to the development of the lecture and the decrease of the class or student work, without which lectures are of very small service. We quite admit that the peculiar circumstances attending the study of architecture in this country may be of importance in this matter, and that the wisdom or otherwise of the course now adopted can only be determined by the result.

Turning now to the subjects included in the lectures and classes of the different "divisions," we see that in each "division" there are four subjects, and that by some slight alterations in the position of some subjects, and the placing of others under the heading of "extra subjects," the work in each "division" is equalised as compared with the variations between the "years" of the curriculum of last session. In Division I. we find the Orders of Greek and Roman Architecture; Elementary Construction; the Rudiments of Perspective and Elementary Physics. Of these, the first two appear, from the syllabus, to be practically the same as in last session's curriculum, but the lectures on perspective are far more practical and more suited to the requirements of architectural students than before. It seems to us rather a bold experiment to place elementary physics in Division I., which is, presumably, intended for elementary students; but, although bold, the course has nevertheless this justification, that the younger students will have forgotten less of their school training in mathematics, and will, at an early stage of their technical education, be shown that the use of formulae and of graphical methods of treating statical problems is not so great a bugbear as it too often appears to the architectural student.

In Division II. we have lectures and classes on English Architecture; Materials; Elementary Ornament and Colour Decoration; and the Strength of Materials, Stresses, and Strains. These subjects, with some modifications, remain as in the last session's curriculum, except that the class for elementary colour decoration appears to be a continuation rather than a repetition of last year's course, it being presumed that students will remain more than one year in the class. This is certainly highly desirable, as it is beyond question impossible for anyone to obtain an adequate knowledge of even the grammar of colour decoration in one session. We cannot too much commend the care taken in the preparation of the syllabus of this class by the inclusion of a list of reference-books and places for study, emphasising, as it does, the constant necessity for individual and independent study, a necessity that exists not only with regard to colour decoration, but in all architectural scholarship.

In Division III. there are lectures and classes on The History of Architecture; Materials; Colour Decoration (advanced); and Sanitary Science (drainage and water supply). We note, with some amusement, that in the curriculum the first of these subjects is described as "The History of Architecture, and features, mouldings, and ornaments," as though "features, mouldings, and ornaments" were not an integral part of "the history of architecture." We trust that it will never be forgotten either by lecturers or students that the history of architecture is, emphatically, not the history of architects or of buildings, but of the expression in building of the needs, the circumstances, the opportunities, and the artistic feelings of peoples and nationalities. The late Mr. Fergusson has, in many of his writings, laid much stress on the ethnic side of architectural history, and the lines of thought and investigation which he pursued may be trusted, if they are fully worked out, to yield important results in the future. Undue prominence has, undoubtedly, been given in some of the examination papers set at the Institute on the history of architecture, to names of architects and dates of buildings. But this is not "history of architecture," and has afforded a handle for some of the detractors of the Institute and its examinations. Returning to the Association curriculum, we see that Mr. Warren no longer fills the post of instructor in colour decoration, and we are glad to be able to state that his retirement is not due to any share he may have taken in the "memorialist" controversy, but is necessitated by the lack of time at his disposal in consequence of increasing work. The loss of their instructors, through the claims of private practice, must

ever be one of the disadvantages under which the Association labours, as long as the post of instructor is filled, as at present, by those whose ability is superior to the emoluments which the Association can offer. Looking down the list of lecturers and instructors we cannot find one whose time would not be better occupied, from a pecuniary point of view, if he were not assisting in the educational work of the Association.

In Division IV. we find lectures and classes on the History of Architecture (in continuation of those in Division III.); Sanitary Science (ventilation, lighting, and heating); Painting, Sculpture, and other Arts allied to Architecture and Professional Practice. When we mention that amongst the lecturers in this division are to be found the names of Mr. T. Stirling Lee, Mr. Walter Crane, and Mr. E. T. Hall, we feel justified in what we have said as to the calibre of the instructors of the Architectural Association.

The "extra subjects" include Plane and Solid Geometry, Geology, Mensuration, Land Surveying and Levelling, Chemistry of Building Materials, and Quantity Surveying, of all of which it may justly be said that, whilst eminently desirable for the complete education of an architect, they can hardly be described as absolutely necessary. The Committee have, therefore, acted wisely in so arranging these subjects that students may select which they please, and may take up their study at any period of their training that best suits them.

Turning now to the Studio, we find that this, which has proved so successful an innovation in the work of the Association, is to be continued on practically the same lines as before, though here, as in the lectures and classes, there are as "extra subjects," Sketching and Measuring; Elementary Water Colour; Water Colour (advanced); and Modelling; in respect of which students at any stage are allowed free choice. There is one matter in connexion with the Studio on which we feel compelled to speak otherwise than in terms of praise. We refer to what are termed "meetings for the exhibition and criticism of the students' drawings." These are intended to fill the place of the old Classes of Design, which have from the earliest days of the Association been vital parts of its work, and the apparent loss of which has been deeply regretted by many of the students as well as by older members of the Association who have passed that stage. Practically, we believe that these criticism meetings have been almost entirely confined to those who are actually working in the Studio, and we know of several members who, although they do not wish to make full use of the Studio, would be exceedingly glad to work on the lines of the former Classes of Design, preparing their drawings at their own homes, and then bringing them up for criticism and discussion. The desire of these members might be easily gratified by the publication in the Brown Book of the dates of the criticism meetings, and particulars of the subjects for which designs were to be prepared.

One of the blemishes in the generally excellent curriculum of the Association is the lack of opportunity for the discussion of artistic matters amongst students of the same age and capabilities, other than that afforded by the general meetings, the necessary formality and publicity of which are rather deterrent to younger members. The successful and invaluable Discussion Section does not meet the case, for of the twelve subjects to be there considered two only are definitely concerned with the artistic and æsthetic side of architecture.

We see that the Committee have not yet decided to institute either day classes or handicraft teaching, and we think they are quite wise not to attempt either of these, at any rate for the present. Their ship is quite sufficiently loaded, and however desirable instruction in handicrafts may be,—in the opinion of some,—for the young architect, it is difficult to see how these can be managed as a part of architectural training, until architects, as a

body, are more ready to allow their pupils time during office hours to attend at classes. At present the young architect who has time and inclination for learning handicraft, can avail himself of the classes intended primarily for the improvement of young workmen, whether at the various Polytechnic institutions now becoming fashionable, or at the more æsthetic Guild and School of Handicraft. It is, indeed, quite open to question whether the Architectural Association would do well to leave the teaching of handicraft entirely to such institutions, and content themselves with that which they have so well undertaken,—the technical instruction of architects.

A careful perusal of the curriculum we have been noticing can hardly fail to show that, at the Architectural Association, any young man of average industry and ability can find ample instruction of the very best quality to enable him to become a qualified and capable architect, whether or not he intends to pass the examinations of the Institute. We cannot conclude without saying a word as to the scale of fees. When we see that for the sum of forty guineas an architectural student can obtain four years' thorough instruction, both in studio and in lectures, we cannot help feeling that he is in far more favourable circumstances than those in his own station of life who intend to enter the professions of law, medicine, or the Church.

FURTHER CORRESPONDENCE ON THE INSTITUTE.



THE correspondence in regard to "The Institute and Architecture," printed on another page, throws some further light on the situation.

It is satisfactory to find that an architect like Mr. Ernest George not only sees no bugbear in the idea of the examination of candidates for associateship in respect of their practical knowledge, but also recognises that a student may reasonably be examined in design, "as a test of his capacity to put his ideas on paper, or in other words to express himself grammatically." It is somewhat significant to have this important admission from Mr. Ernest George, since it cannot possibly be pretended by the critics of the Institute that he does not represent the artistic side of architecture, or that he is a mere surveyor desirous to see architecture treated as a business. Mr. George recognises also the value of an examination as laying down a course of study for the student, and giving an aim and purpose to his work; a view of the matter which was forcibly expressed in a letter in our columns some months ago by a young architect who declared that the Institute examination programme was the first real and efficient guide to his studies that he had, and that in his opinion it would be "a boon to thousands."

We also recommend to our readers the judicious letter of Professor Roger Smith in regard to the question of requiring Fellows also to pass an examination for election. He recognises entirely what we have already pointed out, that such a course would be an anomaly in such a society as the Institute, and suggests a course by which candidates for Fellowship who have not entered the Institute through the door of the Associateship examination should be recommended for election on the basis of their known works. This recommendation seems to fall in with the idea already suggested by some others of our correspondents, that election to the position of a Fellow should be an honour conferred as a recognition of excellence, and not a mere right to be claimed after so many years' practice as an architect. There is a good deal to be said for this idea, which would certainly tend to raise the standard of future Fellows of the Institute, and to render the honour of election as a Fellow more valuable. But if Fellowship is to be a distinction, it must be one conferred on broad lines, for distinguished excellence in planning and construction of buildings for prac-

tical purposes, as well as for the designing of picturesque architecture, or what is supposed (sometimes unnecessarily) to be such. We fear that some of those who wish the title of Fellow to be conferred as a distinction, would, if they had their own way, confine the distinction to those whose ideas of artistic design in architecture coincide with a rather narrow standard of their own,—a standard which sometimes is in reality (though they may not perceive that) rather a matter of fashion than of serious aesthetic consideration.

In fact, at the root of all this disagreement lies the forgetfulness of the truth that architecture, save in some exceptional cases, is not a pure art, but a pursuit involving serious practical problems, in the proper treatment of which public convenience and public safety are largely concerned. Mr. Jackson's position, as represented in his letter, would be a perfectly defensible and logical one if architecture were a pure art like sculpture and painting—which it is not. Mr. Jackson says he and his friends want nothing, they only want to be let alone, and that it is the Institute who are the aggressors. That surely can only be said in a technical sense, if at all. Those who were present at the reading of Mr. Jackson's paper at the Architectural Association last season, and at the discussion which followed it, and who took note of the acrimonious and bitter things that were said, and of the temper of some of the speakers, must surely have thought that Mr. Jackson's allies, at all events, were very "aggressive" people indeed; and we should imagine that architects from France or Germany, if any had been present, would have found it hard to understand that all this indignation was directed against an institution which had committed no other crime than endeavouring to ensure that architects entering its ranks and bearing its *imprimatur* should have shown that they possessed adequate practical knowledge of their craft, and indicating a course of study for architectural students. As we have already said, we believe that those who regard this attempt with contempt and indignation stand entirely alone in the world, and that their feelings would be quite incomprehensible among architects anywhere out of this country.

In short, it appears to us that the indignation aroused against the Institute on account of its examination scheme is one of the most whimsical incidents in the whole curious history of architectural parties in this country. Mr. Jackson says it will prevent all who take a serious view of architecture from joining the ranks of the Institute. What is a "serious view" of architecture? It seems to us that the most "serious" view possible is that which regards architecture as the art of planning and constructing healthful and convenient buildings further dignified and embellished by artistic expression and detail, and that the view that any one who feels the power of giving artistic expression to building should *ipso facto* be recognised as an architect is a view very deficient in seriousness. Mr. Jackson further points out that by adhering to its policy the Institute has lost its men of the greatest promise. Let us say "some of its men of the greatest promise." We admit that the secession of the gentleman named is an injury to the Institute, a consideration which seems to be rather a matter of gratification to them and their friends. Might we suggest to them to consider, not what harm they have done to the Institute, but what good they have done to architecture, by seceding. They could have done good by remaining in the Institute and helping to make it all it ought to be and might be. They have given up the opportunity now, with no advantage to any one that we can see except affording themselves the opportunity for a display of what we venture to think a rather impracticable spirit of opposition, and the public the spectacle of a house divided against itself.

As to Mr. Jackson's final criticism, we did

not intend to quote Wren's official title of "Surveyor to the Fabric" quite seriously, or to represent it as meaning exactly the same as "surveyor" in the present; still it is a kind of title which savours more of business than of art, and is rather more significant in that sense than Mr. Jackson seems to admit. We were thinking however not so much of Wren's title as of Wren himself, who was essentially a practical man in little and great things connected with building; a mathematician too, who applied his mathematics to architecture both in regard to construction and design; but all this did not prevent his being a building artist in the fullest sense of the term. He took, in fact, a "serious" view of architecture in every sense of the word, yet if he were living now we imagine he would be on the side of the Institute.

NOTES.

IN a letter to the *Times* of the 19th Mr. C. F. Hayward, as District Surveyor for St. Giles and Bloomsbury, calls attention, in connexion with the recent fire in Montague-place, to the danger to the British Museum from the combustible sheds and other buildings which are ranged against the garden-walls of the houses, on the Museum ground, and in near proximity to the main building. The British Museum is one of the buildings exempt from control under the Building Act. The danger is perhaps not a very serious one, considering the solid construction of the Museum itself, but the question suggests itself whether there is not an ultimate possibility of clearing some of the ground near the Museum of houses and their outbuildings, and giving space for the extension of the Museum and its enclosure. There can be no doubt that the Museum is greatly cramped for space at present, a difficulty which is not likely to diminish. Some public money might be well expended in purchasing property to clear the Museum and give it space for safety and for future extension.

IN the Mineralogical Department of the New Natural History Museum at Vienna, the visitor finds a separate collection labelled "Building Materials." This summer, a catalogue to this collection has been printed, and, with the aid of this excellent little publication, one is now able to obtain a thorough insight into Austria's resources, and also, to a certain extent, of the resources of the world. The collection, as we now find it, is an extension of a small one which Herr Felix Karer began to arrange in 1878, with the purpose of showing the different materials used in the many monumental buildings being put up in Vienna during the last two decades. It includes some seven thousand specimens, and has been divided into groups according to the countries or districts represented, and then into sub-divisions according to the purposes for which the materials were used, commencing (1) with the different kinds of gravels and ballast used for road-making, (2) the stones suitable for pavements, then (3) the raw material which is turned into bricks, (5) into lime, and (6) into cement, and further (4) the different kinds of sands used in mortar, then continuing with (7) freestone, (8) decorative stone, (9) slate, and finishing with (10) artificial stones. Whilst all specimens of loose materials are exhibited on small trays, the stones proper and artificial stones are shown in small blocks measuring 12 by 8 by 3 centimetres, a size far more practical than the heavy and ungainly cubes of 10 cm. which are to be found in similar collections in Budapest, in Washington, and elsewhere. Of the non-Austrian countries, Germany, Italy, France, Belgium, and the United States make the best show, and England the worst, only having some forty exhibits in the cases allotted to her. This dearth of specimens in the English subdivision is entirely due to the lack of contributions from public institu-

tions and trade magnates. Professor Rupert Jones is apparently the only English scientist who has, to any extent, aided the efforts of the organisers of the collection, and Messrs. Dunnill & Co., of Jackfield, the only representatives of the trades. The catalogue is a model one, clear, concise, and well printed, giving the position, name, and exact part of a building where any of the more important specimens shown in the collection can be seen in Vienna, and ought to be a boon to the local architects and professional visitors. A chapter in the Italian division of the catalogue bearing the title "Ancient Rome" shows that the Building Materials Collection of the Vienna Museum deserves the attention also of the archaeologist.

THERE is to be a special exhibition of library architecture at the Chicago Exhibition, and Mr. James D. Brown, Librarian of the Clerkenwell Public Library, writes to us that he has been requested by the Chairman of the Library Architecture Committee at Chicago to form a collection of British library plans for this department of the Exhibition. Mr. Brown wishes through our columns to invite contributions from architects who have designed library buildings in this country. The exhibit of plans is intended to be as practical as possible, and for this reason only floor-plans, showing existing arrangements of shelving, tables, counters, racks, &c., are desired. It is, therefore, suggested that floor-plans drawn to a 3-in. scale, be sent, and that only the part of the library used for work be shown. This may, however, include museums or art schools where worked along with the library. Photographs or drawings of elevations may also be sent if thought necessary, and any point which may be considered new or uncommon in regard to construction or arrangement might be emphasised. It is intended to publish a report on the library plans represented at the Exhibition, and it is hoped that the results of such a great international collection may be preserved in a manner likely to prove of great use in the future. Mr. Brown will give any further information desired by intending contributors, and plans proposed to be shown should be sent to him at the Clerkenwell Public Library not later than Christmas.

A CORRESPONDENT last week suggested that architects should write on their drawings, "Copyrighted by —" in order to keep the copyright in their own hands. But it is obvious that if the law assumes that the legal right to the drawings is in the employer and not in the architect, the mere fact of writing these words on the drawings would not reserve the right unless the employer agreed to the reservation. Silence does not give a consent in law, and if a dispute arose in regard to the ownership of such drawings, the mere fact that these words were on them, and that the employer did not assert his right by any actual words, would not justify a court of law in saying that he had parted with the assumed right. The fact is that, having regard to the state of the law, an architect can only make sure of keeping a right to the drawings in his own hands by informing his employer at the time when he receives the commission that he will retain the copyright himself. It will be observed that in what we have here said we have drawn no distinction between preliminary drawings and approved final drawings. But it is obvious that there is a fundamental legal distinction between the two cases, and the very principle of the rule by which final drawings become the property of the employer appears to militate against preliminary and unapproved drawings being considered the property of the employer. The object of this note, however, is to point out the futility in law of the words "copyrighted by —" and not to discuss the question of copyright or the case of Sir Charles Barry and the Government, the importance of which from a legal point of view has probably been much overrated by the architectural profession.

THE run upon the Birkbeck Bank last week was no doubt ludicrous, but it was more pitiful than amusing. The collapse of the Liberator Building Society had scared a large number of persons who invested their savings in building societies, and the Birkbeck Bank being connected with the Birkbeck Building Society, a very small and quite unfounded rumour was enough to send scores of persons already alarmed to withdraw their money. But it shows the amount of distress which the collapse of a building society creates; it destroys in a day the savings of years of a class of persons who have the most difficulty in putting by money, and it creates a widespread distrust. In many respects there never was a worse form of investment for the earnings of clerks and others than that of a building society. Because there must always be a considerable amount of risk in respect of events whose which are the best managed. Well-meaning judgment will not always insure success in regard to operations in connexion with land and buildings. No doubt building societies appeal to various dominant instincts,—to the love of thrift and to the love of gambling,—and we suppose they will always remain more or less popular. But every year it becomes more and more clear that the prudent investor of small means must continually exercise personal caution and constant supervision over any society in which he may have placed his savings, and this is usually what he cannot do. We can only hope that the cases of the Liberator Building Society, and of the Glamorganshire and London Provident Building Societies, which are the two last examples, in one instance of fraud, and in the other of "non-liquid" investment, will so brace up public opinion that before another season elapses some stringent legislation may take place which will make these societies more secure. On the other hand, no legislation can prevent over-sanguine managers from over-rating their societies, and no audit can tell to a nicety the realisability of assets.

THE old room which formed one of the late Lady Hill's apartments in Hampton Court, and is now to be opened to the public, is, we understand, that known as "Wolsley's Closet," between the eastern side of the Inner, or Clock-court, and the Communication, or Mantegna, Gallery, overlooking Fountain-court. Reduced in dimension, it retains many of its original features. It has an inner closet, made in the wall, a Tudor fireplace, and its original mullioned window. Mr. Ernest Law, in his well-known work upon the Palace, gives an illustration of the interior, and says:—

"The ceiling, however, is the chief point of interest, and is very beautiful, being of pure cinquecento design in octagonal panels, with decorative scroll-work and other ornaments in relief. The ribs are of moulded wood, with balls and leaden leaves at their intersections; these and the ornamental work within the panes are gilt, the ground being of light blue. . . . Round the upper portion of the walls, on two sides, is a finely-wrought cornice or frieze, in the same style as the ceiling. . . . [which] certainly formed part of the original decoration of Wolsley's Palace, for it is emblazoned with his motto. . . . Below are several long narrow panels, painted in oils, somewhat in the style of Primitivo, with subjects from the Passion."

The Cardinal's own rooms, which he embellished in sumptuous fashion, lie along the southern side of Clock-court; they are partly concealed by the Ionic colonnade which Wren erected to cover the entrance into his King's grand staircase. These are privately occupied: one, lighted by an oriel window towards the court, has a fine ceiling with wooden ribs and papier-mâché ornamentation; the panelling of two others exhibits two different examples of the linen-fold kind; whilst the ribbed ceiling of another displays the Cardinal's hat, crossed pole-axes, and his other badges. These, looking out upon the old Pond-garden and the later viney, now stand at about midway of the palace south front: see the view published in the *Builder* of July 25, 1885. King Henry VIII.'s apartments formed the Clock-

court's eastern side; beyond lay Cloister Green-court, with the King's and the Queen's "New Lodgings," all pulled down temp. William III., and replaced with the apartments around Fountain-court, to many of which the public have had access for fifty years past. Additional interest attaches to the block we describe as having been occupied, it is believed, by Charles I. during nearly three months, where he negotiated with Cromwell, Ireton, and Fairfax, the army being stationed at Putney; was visited by his children; and whence he escaped from surveillance on November 11, 1647, with John Ashburnham, Major Legge, and Sir John Berkeley, to the Isle of Wight. On March 24, 1885, we published Mr. P. L. Marks's measured drawings of two elevations, with details, of Fountain-court; and on October 17 last year Mr. W. Wonnacott's measured drawings of Henry VIII.'s great hall. Last winter they replanted turf in the Base-court (Base-court) in place of the large white cobblestones, which William III. laid there.

THE Richmond branch of the Selborne Society are minded to provide a memorial to James Thomson more worthy of him than the board—inscribed with some verses from "Summer"—in the grounds of Pembroke Lodge. Thomson lived for many years at Rosedale, a little cottage on the outskirts of Old Deer Park, in the lane that led from the upper end of Richmond-green through what was Park-shot, to Kew Foot-lane; and there he died on August 22, 1748. George Ross, an army agent, bought the cottage out of respect for the poet's memory; added rooms to it, and a garden, in which he planted some choice exotics. Having passed to Admiral Boscawen's widow, and then to Lord Shaftesbury, it was adapted, in 1866, for purposes of the local hospital. Thomson was buried at the west end, north aisle, of the parish church, where Lord Buchan (in addition to the annual commemoration he instituted at Ednam, the poet's native place) set up, in 1792, a brass tablet, bearing an appropriate quotation from "Winter." The monument, with bust, in Westminster Abbey, was set up in 1762, from the proceeds of a subscription edition of his works.

A SCHEME for the purchase of the open space now used at Earl's Court for exhibition, as a public park, appears to be in the air. There is no doubt that it would be a great public advantage if this land could be utilised for this purpose. From a purely financial point of view it would well repay the owners of houses in this district to combine to purchase this land, as it would greatly improve the district as a residential neighbourhood. Although South Kensington and Brompton are crowded with what builders have jocularly called "gardens," these are, in most instances, comparatively narrow streets, and one great drawback to this part of London is the absence of any large open public park or gardens. We have some doubt, however, whether sufficient energy and organisation will be given to this scheme, and we should not be surprised to see this space remain an Exhibition ground for some time to come. But nothing would do more for the health of this district, or tend more to raise its somewhat declining favour as a place of residence, than a park at Earl's Court.

THE sanitary condition of the Aylesbury Rural Sanitary District has been the subject of a report by Dr. Theodore Thomson to the Local Government Board, dated August 8; and a very delightful district this seems to be:—

"The large majority of the dwellings in the district are cottages, of which the old thatched or tiled cottages are very commonly unfit for human habitation. The state of dilapidation of these cottages is in some instances so great that they can only fitly be described as 'ruinous,' and into these and many others less seriously dilapidated, rain finds its way through the roof. . . .

In certain villages the demand created for houses is such that no landlord has ever any difficulty in letting his cottages, however bad they may be;

and hence in the absence of due control over their condition by the sanitary authority, these habitations are not kept in proper repair by the worse class of landlords. As a further result, one of the present difficulties in the way of closing houses that are unfit for habitation is, as was pointed out to me by the officers of the Sanitary Authority, that such action in many instances means entirely depriving the family so expelled of house shelter, there being no dwelling to let in the neighbourhood. . . .

Throughout the greater part of the district the prevailing method of excrement disposal is by privies connected with cesspits. These cesspits, generally about 2 ft. deep, and with a superficial area of eight or nine square feet, are constructed of brick, and are usually very loosely covered or entirely uncovered, permitting the entrance of rain and surface water. No ashes or other material are thrown on the excreta; and the decomposing mass of semi-liquid filth which the cesspits commonly contain is very offensive.

As the walls of these receptacles are not watertight, leakage is liable to occur into the surrounding soil or into ditches, when, as sometimes happens, privies are situated on their banks. . . .

The cleansing of cesspit privies is not undertaken or contracted for by the Sanitary Authority. This duty is cast on the occupier, and, in the event of his failing to perform it, he is liable to be called on by the Sanitary Authority to cause his cesspit to be cleaned within a given period. In many instances, however, I found these cesspits full, and oven overflowing. . . .

The privy structures are sometimes of brick, sometimes of wood; and are in many instances so ruinous as to be unsafe. They are situated in the yards attached to the houses, and very often they are close to or actually abutting on the dwellings. . . .

Save in the strictly rural part of the district, and in the smaller villages, in which there are no covered drains, public sewers are represented by stretches of rubble drains, alternating with brick barrel drains, glass or pipe drains, and porous unsocketed pipes. These are often laid at improper angles and with too sudden changes of gradient, and also without sufficient regard to the amount of surface water and sewage to be conveyed by them. . . .

The greater part of the water supply in the district is from shallow wells sunk in the clay; a few wells only are sunk in the rock, sometimes to a depth of 60 ft. to 80 ft. The superficial soil through which wells of both sorts pass is very frequently contaminated by privy soakage and pig-sty drainage, while the surface of the ground about wells is often littered with vegetable refuse, manure, fowl excrement, and other filth. Almost all wells, whether lined with stone or brick, are merely dry-stained, so that percolation from the surrounding soil, with constant risk of contamination of the supply, is liable to occur. . . .

Several cottages at Aston Clinton are not provided with any water, and the occupants of these obtain their domestic supply from the brook that runs through the village. This brook is contaminated by farmyard, cesspool, stable, and slaughter-house drainage, and is further fouled by the large numbers of ducks which dabble in it."

THE recent competition for Llanelly Town Hall seems to have ended not very creditably to the authorities. The assessor, Mr. Charles Barry, adjudged the first premium to the design of Messrs. Simon & Tweedie, and the second to that of Mr. Griffiths. At a meeting of the Council a member at once proposed, at the outset of the proceedings, that the recommendation of the assessor should be set aside and that Mr. Griffiths should be commissioned to carry out the building; and in spite of the representations of two other members of the Council, who proposed and seconded an amendment that they should adopt the recommendation of the assessor, and urged that the first premiated plans were the best on many points, the proposal to engage the architect who had been placed second was carried by a majority of eleven to four. No sufficient or direct reason was assigned for this procedure, but when it is mentioned that the second premiated architect was a local man, and was willing to undertake the work at a commission of four per cent. instead of five per cent., most readers who understand the ways of small corporations in these matters will think there is no need to look further for an explanation.

WE find that in speaking of Mr. Brownell's article on "French Art" in *Scribner's Magazine*, under the heading of "Magazines and Reviews" (*Builder*, September 10), we missed the most remarkable point in the article. One of the darling objects of

American art-critics nowadays is to exalt everything French and depreciate everything English, and accordingly it is not surprising to find Mr. Brown exalting Claude above Turner, and speaking of the "unlucky ambition" of the latter in desiring to have one of his pictures hung next to the finest Claude in the National Gallery. But behold, among the illustrations to the article is an engraving of that very picture of Turner's, which he desired to have hung in this ambitious position, with the title printed under it, "Dido Building Carthage: Claude" (!). We congratulate the American critic on this evidence of his profound insight into Turner's weakness and Claude's superiority, and can only apologise for being so late in doing justice to it.

THE SANITARY CONGRESS.

We continue our report* of the proceedings of the thirteenth Congress of the Sanitary Institute, which has been held at Portsmouth. After the five conferences which concluded on Tuesday night the rest of the work was divided between three sections: Section I, Sanitary Science and Preventive Medicine, presided over by Professor J. Lane Nottor; Section II, Engineering and Architecture, presided over by Mr. James Lemon, C.E. and F.R.I.B.A. (Mayor of Southampton); and Section III, Chemistry, Meteorology, and Geology, presided over by Dr. W. J. Russell, F.R.S., &c.

Engineering and Architecture.

This section held its first sitting on Thursday morning, when Mr. Lemon delivered an inaugural address in which he sketched the progress of sanitary engineering. It was, he said, a modern science, which had originated since the passing of the Towns Improvement Act of 1847, and the Public Health Act of 1848, in investigations made by medical men into the causes of zymotic diseases in towns. It was found that want of efficient sewerage, defective house drainage, pollution of drinking-wells, badly-constructed dwellings, and want of ventilation were among the main causes of the high death-rate. The medical profession had always been pioneers in sanitary reform, and when they proved that certain diseases were preventable, public opinion was gradually roused, and eventually the sanitary engineer was created. The first engineers, of course, made mistakes, but English perseverance came in, and to-day England held the front rank, with only one competitor,—America,—nearly abreast. The available fall for the drainage and the available supply of water were the first two points to be considered in the sewerage of a town. There was a tendency to make a more liberal provision for the water-supply per head per diem than was thought necessary a few years ago. Water-closets were becoming more general, and baths in small houses more common. In Southampton houses letting at only 26s. per annum were provided with baths, and in some cases workmen's dwellings of only 16s. rent were similarly provided. Sewers were better flushed, roads were more frequently watered, urinals, courts, channels, and gulleys flushed down. This all meant more water, and with it a higher state of cleanliness and improved health. In small towns 20 to 25 gallons per head was sufficient; but in towns of 50,000 and upwards 30 gallons per head should be provided. Subsequently referring to the principles to be kept in view as regards sewerage, it was recommended that all sewers should, if practicable, have a self-cleansing velocity. Sir Frederick Bramwell had allowed for a quarter of an inch of rainfall in twenty-four hours in the calculations made for the sewerage of Portsmouth. This was the Metropolitan scale, exactly that adopted by the late Sir Joseph Bazalgette. It had failed in London and Portsmouth, and it would fail everywhere when adopted under similar conditions. In the northern portions of London the old sewers were above the level of high water in the Thames, but in the south of London and other low-lying parts there was no free outfall, and the heavy rains must either saturate the subsoil or flood the surface of the district and the basements of the buildings. In London the special supplementary surface drainage outfalls had been constructed to remedy the defects that arose from the design of the Metropolitan Main Sewerage, and in other towns where this scale

had been followed the local authorities would similarly have to adopt remedial measures. The important point was that they should deal with rainfall according to local circumstances, having reference to the fall in the district, the relative levels of the district with the river or sea, and to the geological conditions. It must not be left to take care of itself; it must be calculated and dealt with with as much care as the water-supply. In low-lying districts it should be provided for by a duplicate system of sewers, and lifted by steam or other power above the level of high water. The Corporation of Portsmouth was very fortunate in having a large harbour and rapid tidal currents, which carry away the sewage of the town. These natural advantages had been utilised to their fullest extent in the construction of the sewage storage-tanks and outfalls, and he had every reason to believe there was no return of sewage on the foreshore and no nuisance. But the young engineer must not take Portsmouth as an example, and adopt the principle somewhere else where the local conditions might be altogether different. Sea outfalls required the greatest care as to their placement and construction, and if the currents were not favourable crude sewage should not on any account be discharged from them. In cases of this kind precipitation must be resorted to, and only the effluent be discharged into the sea. Among the questions which were agitating the public mind was that of the ventilation of sewers. Inquiries were being continually made by local authorities, patents taken out, and experiments made by experts, but they were practically to-day where they were thirty years ago. The prevailing system was that of open gratings over the manholes in the centre of the streets, but this had the disadvantage in some cases of causing a nuisance to passers-by, and to the occupants of adjacent dwellings. He contended there could not be too many inlets and outlets to a sewer, and after forty years' experience, he had come to the conclusion that an open sewer down the centre of a street with a good fall, would be the best form of construction. That, however, was impracticable; and he, therefore, said, "Get as near to it as you can." When a ventilator smelt, the local authorities generally ordered it to be closed. Greater folly could not be committed, for if the smell was not allowed in the streets, it would most likely appear in the houses. Noxious gases could not generate in a sewer with a self-cleansing velocity. A ventilating device called Keeling's Destructor, which had been tested on a large scale at Croydon, was very highly commended by Mr. Walker, the Borough Engineer of Croydon. With respect to the disposal of sewage in towns, continued the paper, the system of precipitation was growing more into favour for the following reasons:—Firstly, the improved means of disposing of the sludge; secondly, the failure of so-called sewage-farms; and, thirdly, the growing tendency to combine precipitation with land filtration. On the question of healthy dwellings, the lecturer said: "We are now face to face with a cholera epidemic, and it is necessary that the most improved regulations for the preservation of the public health should be everywhere enforced with the utmost strictness. The towns of Hamburg and Havre are illustrations of this want of those essentials of public health. A physician of Hamburg says: 'Unfortunately, Hamburg is built contrary to all rules of sanitation. The houses have no yards, and close behind are other houses, old, many-cornered, dark, and airless, the overcrowded habitations of the poor being filled with dirt and ill-smelling. In addition, the Elbe is partly dried up, and on its banks is deposited all kinds of refuse. On the other side of the Channel we have the large and important seaport of Havre, the normal death-rate of which is more than double that of Portsmouth. In 1884 I prepared a report on the sewerage of this town, the authorities appointed a committee of experts to sit upon it, but nothing has been done from that day to this. These two towns, Hamburg and Havre, are in communication with this country, and they are sending forth a pestilential army to invade our shores. We may by constant vigilance keep them out, but it is a scandal in these days of International Congresses that such sanitary neglect in Germany and France is allowed to exist.' He was certain these Congresses had a tendency to raise the standard of knowledge and of sanitary work amongst his professional brethren. The past history of sanitary science had chiefly concerned the medical officer and Sanitary

Inspector, the future would chiefly concern the architect and the engineer. In proportion as the architect and the engineer did their work well, so would the duties of medical officers and Sanitary Inspectors decrease. The speaker stated that an exceedingly small number of houses, even of those let at high rents, were in a proper sanitary condition. Owners of houses and their agents, whose interest it was to let, could not be expected to answer impartially the question put by an applicant,—Is this house in a perfect sanitary condition? They might be honest in answering the question affirmatively, and yet the tenant might find his family begin to sicken on entering into occupation, and might discover, perhaps, when too late that none of the conditions proper to a sanitary house existed in his dwelling. No doubt the poor were more hardy, and, having to rough it, became to a certain extent disease-proof. Dangers which they escaped would be fatal to children more delicately nurtured, and to the more carefully housed well-to-do classes. No man should take a house unless he had satisfied himself that it was in a proper sanitary condition. In the interest of his family and himself, the speaker would advise every would-be tenant to pay the small cost of an examination by a competent man. He would then feel that he had done his duty as a father and a citizen. The sanitary architect called in (he had coined a new term) should insist on the following points:—(1) a dry subsoil; (2) a damp-proof course either of asphalt or two thicknesses of slate; (3) walls which would keep out heavy rains, or, preferably, hollow walls; (4) a good pitch of roof; (5) good ventilation under the floors, separate from the smoke flues and with proper inlets; (6) drainage in stoneware pipes outside the house, disconnected from the main sewer, and ventilated; cast-iron pipes under the house with lead joints; (7) water-closets with wash-out or flush basins; soil pipes outside the house carried up full size, and ventilated; and (8) sinks of all kinds disconnected from the sewers and discharging over open gratings. With respect to the question of overcrowding, he said occupiers of insanitary dwellings were merely removing to other houses, but the overcrowding still continued. Much had been done during the last year under the Housing of the Working Classes Act, 1890, but a danger still remained which local authorities must face. What was wanted was the erection of suitable dwellings to take the place of those condemned. There was an opening for an architect to design a good healthy dwelling for the poorer working class at a reasonable cost, so that local authorities might be induced to erect them. A good, model working man's home was wanted in our crowded towns, where there was a large dining-room and reading-room common to all, and a separate bed-room for each lodger. Such a place for single men would be much sought after, and would always command good tenants. Sir Charles Cameron, in proposing a vote of thanks to the President, said that papers of that kind, which dealt with practical matters in a concrete form, were of much greater interest to an audience, composed as that was of practical men, than any abstract or merely theoretical discourse would have been, but there were also in it many points of great general interest, particularly to the inhabitants of towns on the coast, for which any scheme that could be prepared would greatly differ from one that would be suitable for towns far from the sea. What might be permissible at Portsmouth, where they had a strong tidal current, could not be permitted in a main drainage scheme for Dublin, for example, where the difficulty was how to dispose of the organic matter, and where they might only discharge what appeared to be a pure effluent. Dublin had not such a good current as Portsmouth, although it was upon the sea. Any solid matters discharged there would come back every twenty-four hours. With respect to the ventilation of sewers, he thought it would be better for the drainage of each house to pass by an open conduit, for then it would only be the persons in each house that would be affected by any smell, and not the whole community by accumulated smells, as in the case of defective ventilation. He had been experimenting for some years, and he had discovered that the air was always going into the sewer, and not out. This was notably the case between 7 o'clock and 8 o'clock in the morning, when fires were being lighted all over the city. It proved that air was being drawn up out of the sewer

* See last week's *Builder*, page 222.

wherever the traps were defective. His impression was that there was not much pressure in the sewer as a rule, and, with house drains properly trapped, the air in the sewer would not be able to force the traps. There might be much more pressure at times from temporary causes, but for periods of eight or ten hours a day he had known the pressure only to be half an ounce or an ounce to the inch. At present, at Dublin they discharged all into the Liffey where it was tidal, but that would all be done away with under the new drainage scheme, because it would be continuous in its working.

Sir Thomas Crawford, in seconding the resolution, said he was reminded, in seeing so many medical men among the engineers and Sanitary Inspectors, of a fact which it might be advantageous to mention. He had been a medical officer forty—nearly fifty—years, and he had never felt the difficulty, that appeared to be a trouble sometimes, of drawing a distinction between the functions of the medical officer and those of the sanitary engineer. There was a very definite distinction between the two. The medical officer should search out the cause of an evil, and leave the remedy for it to be found by the engineer.

The resolution was carried by acclamation, and Mr. Lemon briefly replied.

Softening of Water.

Mr. H. Law, M.Inst.C.E., &c., was then called upon to read a paper on "Apparatus for Softening Water." The rationale of the process, he said, consisted in adding to the water certain substances which reacted upon the foreign substances already contained in the water, forming new compounds, that being no longer soluble, might be removed either by filtration or precipitation. The largest installation he knew of was at Southampton.

The discussion was opened by Sir Charles Cameron, who wanted to know the cost of treating, say, 1,000,000 gallons by the process, and whether it was applicable to refiltering on the large scale. Water, he held, should be used as quickly as possible when conveyed in pipes, and if water that had been filtered remained many days in a reservoir, it should be refiltered.

Mr. Rogers Field, C.E., thought the paper a very valuable one. It proceeded on a very distinct plan, and, tried on a large scale for a public supply, it would be found or the greatest possible advantage where people knew what they were about. He thought pressure should be put upon the water companies to act for the public good, and not exclusively for profit. He had long turned his attention to the question of softening water, and had investigated personally, or through assistants, perhaps every important installation of the kind in the country. The difficulty with the process was not where it was worked on a large scale, but where water had to be softened for a house, or a small number of houses. There were such installations, and when first set up they all looked very nice, but in a little time they choked up. A chance visit would generally disclose the fact that the pipes were stopped up or that they were not getting the right proportion between lime-water and pure water. For domestic purposes a successful apparatus had yet to be invented. On the other hand, any city that would adopt the process for public purposes would reap a great advantage. Merely in the money point of view they would realise a great economy.

Mr. W. Whitaker, F.R.S., &c. (engineer, Southampton Waterworks), said that at Southampton they reduced the hardness of the water from 18 degrees to 8 degrees, using as little lime-water as possible. In the North of England it had been found they were getting their water too soft. Water that was too soft was not wanted. The trouble was to get rid of the deposit. There was an opportunity for inventors to find a profitable use for a new waste product. He hastened to say at once they could not make whitening of the lime residuum. The cost at Southampton was a farthing per 1,000 gallons, say, for a million, the professional guinea; at Bedford, a smaller town, it cost nearly a halfpenny per 1,000 gallons. With regard to water companies who pooh-poohed the proposal to adopt the process, he knew some of these who softened all the water they used in their own boilers. Mr. Whitaker, in conclusion, invited the members of the section to visit Southampton to see the process at work.

Dr. Axford and Mr. F. B. Chappell having spoken, the Chairman, in closing the discussion, said that at Southampton they saved

the softened water for the higher purposes, and used the other for the drains and the streets.

Mr. Law, in reply to a vote of thanks, said that at Southampton they had no tanks. Mr. Whitaker had correctly given the cost, but with tanks it would be reduced to the mere cost of the lime. Of course the process was applicable to Dublin, but for dietetic purposes it was often a mistake to soften the water. He endorsed the opinions of Mr. Rogers Field, who had great experience. The great difficulty, as he stated, was the small apparatus for domestic supplies. The residuum was valuable as a top dressing for land.

Water-Supply and Purification.

In other sections of the Congress, "Water" was the subject of several papers and discussions. Dr. Horace Swete read a paper detailing a process of purification of the waters of the Severn at Worcester by metallic iron; Mr. W. Whitaker (water engineer, Southampton) read papers on the "Water-Supply in the Central and Eastern Parts of the London Basin," with maps and diagrams of "Local Geology from the Sanitary Standpoint," and Mr. W. C. Young presented one on "The Determination of Dissolved Organic Matter in Water."

The Worcester experiment, as described by Dr. Swete, appears to be succeeding perfectly so far as it has gone. Three purifiers capable of dealing with 1,700,000 gallons of water per day have been put down on certain conditions, a company undertaking during a period of six months working to adequately purify the very impure water of the Severn, which, before reaching Worcester, has received the sewage and refuse of Llanidloes, Newtown, Welshpool, Montgomery, Oswestry, Shrewsbury, Trowbridge, Bridgworth, Cradley, Stourbridge, Kidderminster, Stourport, Bromsgrove, and Droitwich. It is an application of the principle of the spongy-iron filter, with a modification suggested to Dr. Anderson by Sir F. Abel after the spongy-iron process had failed for the waterworks of the city of Antwerp in 1884. The suggestion was that if the spongy-iron could be kept in motion in the water to be filtered it might be more successful, and on this idea Dr. Anderson designed his Revolving Purifier, the apparatus now on trial by the city of Worcester. The undertaking is (a) to remove from the water all colour; (b) to reduce the organic matter by 50 per cent. at least; and (c) to reduce the microbes to Dr. Koch's limit for pure water of 100 microbes colonies per cubic centimetre. Dr. Swete thus concludes his paper:—

I think that when a supply of deep well water cannot be obtained the result of the experiment at Worcester shows that there is a process that may render a river or brook water sufficiently good to come within the category of potable waters, and must, therefore, be a subject of interest and importance to medical officers of health.

Mr. Whitaker's maps were prepared and sent to the International Congress of Hygiene and Demography last year, together with a paper, but the paper arriving late was not read.

The principal portion of the discussion in section III. was devoted to the two papers by Mr. Whitaker, who followed the President of the section (Dr. Russell), after he had been accorded a vote of thanks for the presidential address, which was upon "The Chemical History of the Air."

Dr. Russell, in opening the discussion, touched upon the importance of pure water to all communities, and of the fact that had been made clear by Mr. Whitaker's maps and his papers that the water held in the chalk—that his supply—was the purest and best source of high spring for domestic purposes.

Mr. Rogers Field, C.E., said that in the many investigations he had been called upon to make into sources of water supply he had obtained little or no guidance from the ordinary geological maps, because it frequently happened that where chalk was shown they found stiff clay. He should be glad when the new maps had been extended to all parts of the country. Anybody who studied the subject would see that it was of vital importance, for if they calculated upon getting water from so many hundreds of square miles, and only got it from one half, it entirely altered the problem.

Mr. Henry Law, C.E., asked how far the existence of chalk affected the water-supply? Mr. Whitaker had told them the circumstances which affected the entry of water into the chalk, but there was another important question concerning its escape from the chalk. In many parts of the valley of the Thames enormous

volumes of chalk water might be seen running to waste. In an investigation he carried on for two years in connexion with one of the metropolitan water companies, the object being to obtain a supply from the chalk, he found it escaping at the mean level of the tide from Hammersmith to Brentford, and at Erith they might see the same thing.

Dr. Groves (Isle of Wight) mentioned an instance that had occurred in that district of an owner sinking 200 ft. into the tertiary clays to find water for two cottages. He thought all sanitary authorities ought to possess copies of the valuable maps of Mr. Whitaker and his colleagues. The water taken for towns from a distance often prejudiced the local supply. He knew a case in which some cottages had been without water for five or six years through action of this kind on the part of the municipal authorities at Ryde, Isle of Wight. The law ought to be strengthened in this respect, for at present the landlord could only be compelled to supply water when the cost did not exceed 10*l.*, or, in exceptional cases, with the sanction of the Local Government Board, 13*l.*

Dr. Newsholme (Brighton) asked if Mr. Whitaker had seen an article in the *British Medical Journal* stating that, in consequence of water taken from the ground north-east of London, the whole landscape was altering and tree-growth diminishing, and saying that the limit of the water-supply was nearly reached, so that London would have to go to a greater distance for its water. Would there be a sufficient supply in the South Downs without detriment to the local supply there?

Mr. Washington Lyon asked whether London might not obtain a sufficient supply from the chalk beds beneath it?

Mr. Whitaker, in reply to the speakers and to a vote of thanks, said the question of the escape of water was a difficult one to deal with. Speaking of the abundance of water in the chalk, he mentioned the case of Brighton, where, in making a sewer, they accidentally tapped a spring, and were nearly flooded with fresh water. In some places near the sea they could sink wells and get good water; in others a mile away from the sea the wells would only yield salt water. This was noticed in some parts of Essex. And in another instance, a well sunk in the chalk having given only salt water, the bottom level was raised, and they were now getting good water from the upper part of the chalk. When a company took away the water-supply from a district it ought to give a fresh supply at a reasonable rate. As regarded the alleged change in the condition of the country from which water was taken he thought they would want a double million magnifying glass to see it, so infinitesimal was it. There was certainly a large supply in the South Downs, and a large amount ran to waste, which might be taken without disadvantage to anyone. With regard to the water beneath London, he thought they would fail to get a sufficient supply by sinking wells. They might sink 200 wells and only find one of them successful.

Another discussion took place in the afternoon upon a paper by Mr. Whitaker, showing how the water supplies for Portsmouth, which were from the chalk, and for Gosport, which was from strata of clay and sand, were obtained.

The paper described the Gosport Waterworks as an excellent example of the way in which every distinct bed of sand was made to contribute to the water-supply all the way down. He had been struck by the ingenious manner in which, by means of a large well or reservoir, they were able to store a day's supply before they commenced pumping. Portsmouth got its water with the minimum of trouble; indeed, he had never seen a more simple or easy piece of work. The chalk from which it came was at the junction of the tertiary beds, and he was not sure there was not some mixture in the water,—not that this was any disadvantage, for it made it somewhat softer than it otherwise might be. The Waterworks were near Havant, which stood on a gravel flat full of water. The water obtained from gravel strata, through which sewerage percolated, might be deleterious to health, and he urged the Portsmouth people to spare no precautions to prevent contamination from Havant.

Mr. J. H. Ball (Southsea), who opened the discussion, asked for information as to the various springs to be found in the neighbourhood of Havant. He bore testimony to the great care the Portsmouth Waterworks officials took to prevent any contamination of the water-supply.

Dr. Groves pointed out the difficulty always met with in getting ancient wells closed where

there was not evidence of impropriety in the taste or smell. He remembered a case in which the greatest difficulty had been encountered in getting an Order of the Council carried out to close certain wells in the Strand district in London during the last cholera epidemic. One of them, called the "holy well," led to a great fight. In another case great opposition was offered to one being closed in Holywell-street, until, on examining it after the lead pipe had been removed, he found a drain running into it leading from a closet used by cholera patients. The contents of the closet would have found their way into the "holy well" if they had not stopped it up.

Mr. Smith (Engineer to the Portsmouth Waterworks Company), Dr. Axford, Dr. Keatey, the Chairman, and other gentlemen took part in the discussion.

Mr. Whitaker, in reply to Mr. Ball, said the springs referred to near Havant were but the repetition in another place of the springs from which the Water Company got its supply, but they were at a higher level in the valleys of the chalk hills. They were known under a host of names, and he asked Mr. Ball, or anyone else, to record the times of the outbreak of the springs, and as to the water-level of the wells in their vicinity. Mr. Baldwin Latham had taken such careful observations of the outbreaks that he was able to predict on what day, and where, these streams would break out. He urged that no water ought to be got in big towns except from the companies. There were many wells in the area of the Strand mentioned by Dr. Groves. He remembered one in which, when an examination was made, a coffin was found near the bottom.

Smoke Prevention.

At the second sitting of the Engineering Section, a paper was read by Mr. H. S. Terry, F.I.C., on the smoke clauses of the Public Health Act, 1875, the leading ideas in which were:—(a) that grey smoke from domestic and other hearths is more injurious to the public health than black smoke; (b) that the appointment of experts as "Smoke Inspectors" is necessary; (c) that the problem of "smoke prevention" in England remains yet to be solved; and (d) that care should be taken not to harass manufacturers.

In the discussion which followed,

Dr. Black said the blue smoke from cottages might be deleterious, but the black smoke from factories was like an eruption of Vesuvius. Once while staying at the Queen's Hotel, Manchester, he saw smoke in huge volumes issuing out of the chimneys of the Royal Infirmary. Had that occurred at a factory, the owner would have been punished. The other day in Edinburgh he saw the same nuisance arising at a new club-house. He reported the case and was told by the authorities that they had not the least idea of the existence of the evil. With an efficient system of inspection such evils would cease to exist.

Dr. Oldfield agreed that they should be cautious how they harassed manufacturers. It was a question of degree. It ought to be settled to what extent such nuisances could be permitted without being intolerable, and then from that point they might insist on absolute obedience to the regulations. He mentioned a dangerous smoke nuisance from brick-burning at Ealing. There was no black smoke, but a faint and deadly feeling came over persons who breathed the fumes.

Dr. Groves (Isle of Wight) said he hoped to have got some light with regard to the smoke nuisance at cement works. He knew a very great lady who had often had cause to complain of a nuisance of that kind. It would cause people a mile off to cough and sneeze. Chlorine would produce the effect, but there could not be enough of it in smoke to account for it. He believed cement works had been brought under control at Southampton, but he was not able to say how it had been done.

Mr. Lemon (Mayor of Southampton) said he was one of a committee appointed to visit the different cement works all over England, in order if possible to discover the means of remedying the nuisance of smoke from cement works. They had since compelled the cement manufacturers at Southampton to introduce a cremator between the furnace and the chimney-shaft, and it appeared to have been effectual, no complaints having been brought in Southampton of late years against the cement factories.

Mr. Terry, in acknowledging the vote of thanks, replied to the various observations, and

again insisted on the necessity of the appointment of men of acknowledged attainments in science as inspectors.

Ventilation of Drains, and the Pollution of Rivers, &c.

Mr. H. R. Kenwood, M.B., D.P.H., F.C.S., read a paper in the Engineering Section on "Drain and Soil-pipe Ventilation." The present system of soil-pipe ventilation was obviously faulty, said the lecturer, air frequently entering where it should escape, and escaping by the outlet by which it ought to have entered. To secure greater certainty he had attempted to apply a simple remedy,—so simple that he was astonished when he found himself the first to suggest it. In most houses, except the poorest, there was a circulation of hot as well as cold water, and, of course, it was laid on to the bathroom which was generally on an upper floor. His suggestion was to extend the hot-water circulation so as to enclose in a kind of jacket the ventilating-pipe which communicated with the drain for the purpose of securing a constant upward draught and an escape at a point above the roof, of the foul air from the sewer.

In the discussion which followed Dr. Groves, Mr. J. H. Ball, Dr. Axford, Mr. Nanson, Mr. Chaloner, Mr. Symons, Mr. Fletcher, and the President took part. Dr. Kenwood's proposal met with little sympathy in the meeting, one speaker declaring that a southern or south-western aspect would be as effectual as Dr. Kenwood's hot-water jacket, which he thought might be got as an ideal but not as a practical measure.

The usual vote of thanks having been accorded to Dr. Kenwood, the last paper of the day was read by the Vice-President, Major Lovarock Flower, on behalf of the writer, Mr. Heyworth Collins, F.C.S., &c., Analytical Chemist, Bolton. The subject was, "The Pollution of Rivers and Canals by Manufacturing and Industrial Operations." The writer said there did not appear to be any valid reason why every manufacturer should not be compelled to deal with the polluted water upon his own premises. Possibly the most effective and economical way of dealing with the enormous volume of pollution from manufacturing sources was by concentration and evaporation, followed by condensation.

The section resolved that it was desirable that local authorities should have enlarged powers to compel manufacturers to cleanse the rivers into which their waste products ran, and if they did not do so, to carry out the work and charge the manufacturers with the cost. This completed the business of the day, except a paper by Dr. Maguire on "The Prevention of Typhoid," which was postponed to the following sitting.

Disposal and Treatment of Sewage.

At the last sitting of the Engineering Section, which was held on Friday morning, with Mr. H. Percy Boulnois (Vice-President) in the chair, three papers were read, each dealing differently with the disposal and treatment of town sewage. The three papers were read in succession before the discussion was taken.

Mr. E. Scruby (Epping) described a new method of filtration and precipitation, which he illustrated by a diagram. Stimulated by a declaration made in March, 1891, to the London County Council by Sir Benjamin Baker, Mr. Scruby has made many experiments during the last fifteen months with various samples of very offensive sewage, and this paper gave the results. The following was the official engineer's declaration to the London County Council: "It seems to me well nigh impossible to formulate a plan for dealing with and disposing of London sewage in a manner which shall be beyond question." A quantity of sewage having been procured by Mr. Scruby from the drainage outfall and made more repulsive by being kept for a week, a portion was passed through a chamber containing free oxygen and was then found to have become odourless. The inventor next hotted off a portion of the sewage that had undergone a first treatment, a portion of untreated sewage and some rain-water, and put the three bottles away side by side for daily observation. After a few days, while the untreated portion had got worse and the rain-water remained unchanged, the treated portion of sewage effluent appeared to have become clearer. At the end of six months, when all chemical changes appeared to have long ceased in the treated fluid, the bottle was turned half down in an oblique position when a thin film fell from the sides of the bottle and left the contents perfectly clear. This seemed to indicate a third

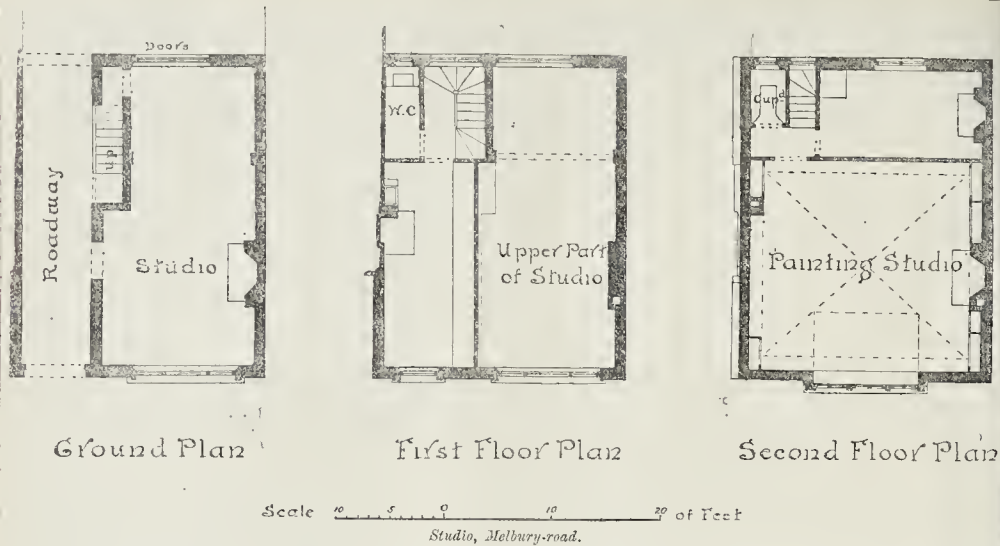
phase of chemical action performed by the oxygen. Later on, during a sharp frost, the treated portion became a mass of the whitest snow, still remaining perfectly odourless, while the untreated portion did not freeze but thickened into a repulsive, greenish mass, emitting a very bad odour. The solid portions, about 3 per cent. of the whole, had been already separated by filtration and rendered innocuous by treatment with burnt lime-stone. The inventor's estimate of the cost of treatment for a town of 40,000 people, allowing 20 gallons per head per diem, was 40*l.* per annum per 1,000 persons, the estimate being based on the cost of fuel, which would produce oxygen gas at 5*s.* per 1,000 cubic feet on the average. In the process of oxygenation, the effluent is resolved into spray in passing through a series of perforated trays within a container. When the resultant liquid is drawn off, the inventor states that he derives from the foulest samples of sewage at small cost, perfectly limpid, inodorous, and translucent water; and he demands from scientists an analysis of his effluent and a test of his estimates.

The second paper, read by Mr. C. H. Cooper, A.M. Inst. C.E., dealt with three modes of "Sewage Treatment;" first, the natural, by which is meant the irrigation methods; second, the mechanical which includes electrical treatment; and, third, the chemical methods. By means of a diagram, the writer of the paper showed the proportions in which micro-organisms exist at different depths on land treated with sewage, to prove his theory that the work of nitrification, which produces such beneficial results in rich moulds, and reduces the most offensive organic matter to innocuous inorganic substances, always takes place near the surface. He has found by many experiments that 61 per cent. of the microbes are found within 1 in., and rather more than 36 per cent. at a depth of between 1 and 2 in., below the surface, leaving less than 3 per cent. even so far down as 60 in. This fact leads him to ask what soil affords the best home for these beneficent organisms to work in, and whether the better results are given by soil protected by a crop or by fallow land? Mr. Cooper states that the death-rate on the sewage farms competing for the City of London's prize is only four per 1,000, and on the Berlin sewage farms, recently described before the Institution of Civil Engineers by Herr Roehling, only 9.75 per 1,000.

The concluding paper, read by Dr. A. Angell (public analyst, Southampton), was largely devoted to combatting the irrigation theory. The rest of the paper was devoted to proving the superiority of the method of purification of sewage by passing it through "polarite," and to showing how the noxious residuum called sewage-sludge, and the equally noxious refuse from gasworks, known as "blue hilly" (waste lime from gas-retorts) can be made into a valuable, inodorous, and in all respects nonobjectionable, hydraulic cement, superior to that used on the Thames Embankment and in many other public works. Two filthy by-products are thus converted into a material used in large quantities and purchased at high prices by corporations and other public bodies. Of this cement several samples were shown which had been produced under Dr. Angell's supervision, and for which a tensile strength was claimed of 293 lbs. to the square in., or 65*l.* to the 1½-in. briquette.

In opening the discussion, Mr. H. P. Boulnois, the Chairman, pointed out the enormous importance that would attach to the invention, if Dr. Angell's provisions were fulfilled, with regard to making cement out of sewage sludge and "blue hilly." Engineers were apt to look at all questions from the *£. s. d.* point of view, and it appeared certain that if what they had just heard was all true, somebody ought to make a good deal of money out of the invention. If he succeeded in converting two repulsive waste products into a useful cement, he would have succeeded in solving one of the most haffling problems that had ever come before the engineer. Mr. Scruby had described a new process, but unfortunately it had never been treated on a practical scale, and they could never tell what the real results would be until it was so tried. Chemical processes required a great deal of watching. Mr. Scruby had not told them how he proposed to deal with the solid deal of London sewage, the treatment of which cost at present 173,000*l.* a year. Mr. Cooper had laid before them a valuable table, with some very graphic diagrams. These enabled them to see at a glance the process going on.

[Continued on p. 245.]



Illustrations.

SELBY ABBEY, EAST WINDOW.

WE give a reproduction of the large drawing of this window showing the restoration of the glass by Messrs. Ward & Hughes, which was exhibited in the Royal Academy this year. The following notes supplied by Messrs. Ward & Hughes are, they inform us, mainly an abridgment of the history of the window written by the late Dr. James Fowler of Wakefield, Secretary of the Society of Antiquaries of Yorkshire:—

"The Selby (Abbey), Carlisle (Cathedral), and Shrewsbury (St. Mary's Church) windows appear to have been originally closely similar in design and treatment. In each case the glass is of a somewhat later date than the stonework which holds it, but the Selby window is the most valuable and important of the three, as containing the whole of the tracery almost intact, and a good deal of the glass of the main lights of the window, some eighteen figures out of an original scheme of seventy, with a large number of fragments of a Tree of Jesse. The Shrewsbury window contains the original figure of Jesse, which at Selby had gone entirely, and this figure has been reproduced recently in the restoration as being the best authority for such a work. This window also has the advantage of the series of Kings and Prophets almost complete, but almost the whole after tracery is modern and not to be compared for a moment with that of either Selby or Carlisle.

The five central lights, out of seven, were occupied by a Jesse Tree with, in the outer light to the (heraldic) right, prophets foretelling the coming of Our Lord, and in that to the left apostles, evangelists, and doctors proclaiming Him as come, and announcing further His second coming to judge the world in majesty. Fragments have indicated that the balance and symmetry of the composition was attained by the introduction of the twelve minor prophets and the four major, balanced by the twelve apostles and the four Latin fathers.

The central light had a red background and border of yellow crowns on a blue background. The light on each side of it had a blue background and border of yellow lions on a red ground; the light on each side of these had a red background and border of brown squirrels cracking nuts, on sprays of yellow hazel on a blue and red background; and, lastly, the two outermost lights had each a blue background and border of yellow triple-towered castles and white covered cups alternately, on a red ground.

The heads of all the seven lights, more or less dilapidated but in the main well preserved, were found, and they were invaluable as giving the key to the order of the lights, confirming the account

given by Johnston in his MSS., and showing the manner in which the Jesse Tree was carried from the main body of the window into the tracery. Owing to the deep recessing of the stonework this portion of the window, like the tracery glass, is scarcely corroded, the colour and painting being almost as fresh and distinct as the day the window was completed. Every particle of background, in whatever situation, was diapered with the most extreme richness, and presents a monument of labour which excites one's wonder and respect in the highest degree.

In the central lights were figures of Masaias (Amziah), Ezechias (Hezekiah), Josias (Josiah), Joachim (Jeholachim), Joseph (the husband of the Virgin), Jeconias (Jechonias), and Herodes Ascalonia (Herod the Great). These figures, in rich robes,—the Kings with crowns, and some with sceptres,—all stood among the leafy branches of a spreading tree, which sprang out of the body of Jesse. The last light contained figures of Mathew, Johannes, Petrus, Paulus, S. Gregorius. Mr. Morrell says S. Jerome also.

Immediately over the representation of the Virgin and Child in the central light, the Crucifixion occupies the first compartment of the tracery, with above it the Holy Dove. This compartment concludes the Jesse.

The Doom in the tracery represents our Lord seated in judgment in the uppermost piece, on His right and left hand are cherubim, the darkened sun, and the waning moon. Underneath the figure of Christ are angels holding emblems of the Passion, angels blowing the trumpets of the Resurrection, and the archangel Michael weighing souls; on the right hand the gate of heaven, on the left the gate of hell; and distributed among the remaining tracery all classes of men rising from their graves, kings, priests, rich, and poor, with angels carrying the redeemed to bliss, and demons the condemned to punishment. Two compartments contained coats of arms; one had entirely gone, the remaining one showed the arms of England (gules, three lions passant guardant), and can scarcely be of later date than A.D. 1310.

The history of the restoration is briefly this. At the commencement of this century the remaining fragments in the window were removed from the stonework, and without much care put into cases and placed in the museum of the Abbey. When through the enterprise of Mr. William Liversidge, of Selby, who has done so much for the Abbey, some four years ago these cases were brought to light with a view to the reconstruction of the work, the prospect when the boxes were opened was not encouraging, for a chaotic heap of glass and lead was all that presented itself. With care and patience on the part of Mr. Curtis (of the firm of Ward & Hughes) order was evolved, and when the fragments were laid out on the floor of the Abbey, after much and lengthy

labour, the original design of the window was beyond question.

The original figures are indicated by the words "old glass" on the accompanying illustration. As regards the freely-designed vine running all over the five central lights, its execution on the glass is exquisite in its refinement and delicacy."

SOUTH LYCHETT MANOR.

No traces remain of the previous Manor House said to have existed at South Lychett. The present fabric—the country seat of Mr. Elliott Lees, ex-M.P. for Oldham—dates from the early part of the present century, and possesses no architectural interest. The general planning of the rooms was good, though the central space, upon which they gave, was unnumbered by a curious network of dark passages, cupboards, and large waste spaces without access, which apparently existed in a strife after an Italian treatment of plaster vaulted corridors.

It was found that by merely lifting out the partitions in the centre, without disturbing the old walls, a finely-proportioned hall could be obtained, with surrounding recessed galleries, upon which the principal bedrooms open.

There is a music-gallery at a lower level across the end, not shown on the drawing.

With the exception of a large window on the new staircase, the hall is generally top-lighted. A system of double glazing is adopted, with an intervening space for cleaning, to which access is obtained from either side of a passage across the ceiling, which conveniently connects the second-floor rooms on both sides of the house.

The work was executed by Mr. Dart, of Crediton, to the plans of the architect, Mr. W. D. Caröe, M.A., F.R.I.B.A. The owls (the owl being the family crest) were modelled by Mr. Hitch, of Kennington.

STUDIO, MELBURY-ROAD.

The illustration is of a new studio in Melbury-road, Kensington, which has been erected for Mr. Hamo Thornycroft, R.A.

The building was carried out in red brick with Portland stone dressings by Messrs. Adamson & Son, of Chiswick. Mr. J. Belcher is the architect. The drawing was exhibited in the Royal Academy of this year, as well as that of "Mark Ash," mentioned below.

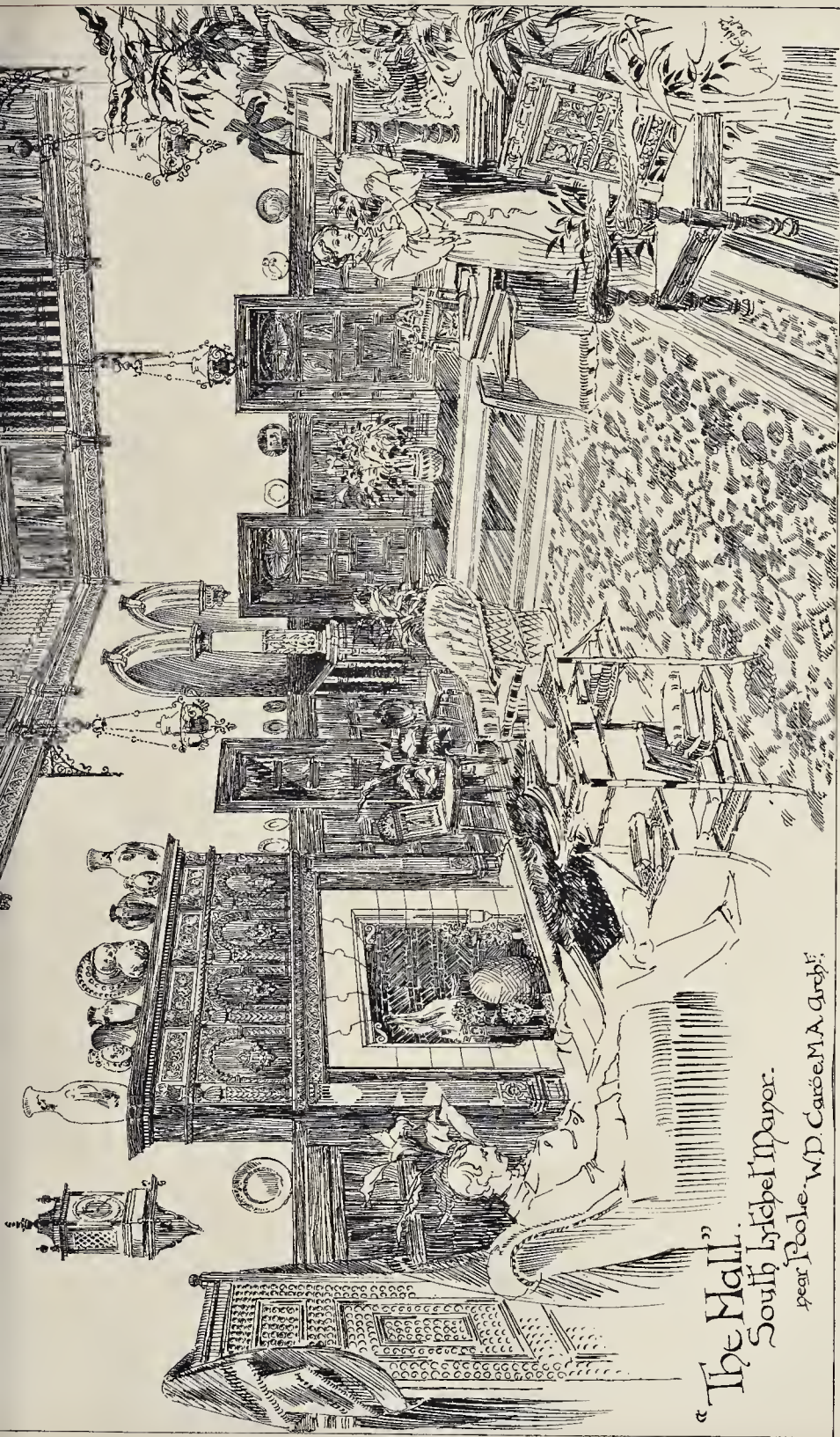
"MARK ASH," ABINGER.

THIS house has been recently erected at Abinger, Surrey, for Mr. E. H. Ledward, under the designs of Mr. J. Belcher. The ground story is of local stone with joints studded with pebbles, the upper portion being of half-timber and rough-cast, and was carried out by local builders, Messrs. W. & G. King, of Abinger Hammer.



THE BUILDER, SEPTEMBER 24, 1892



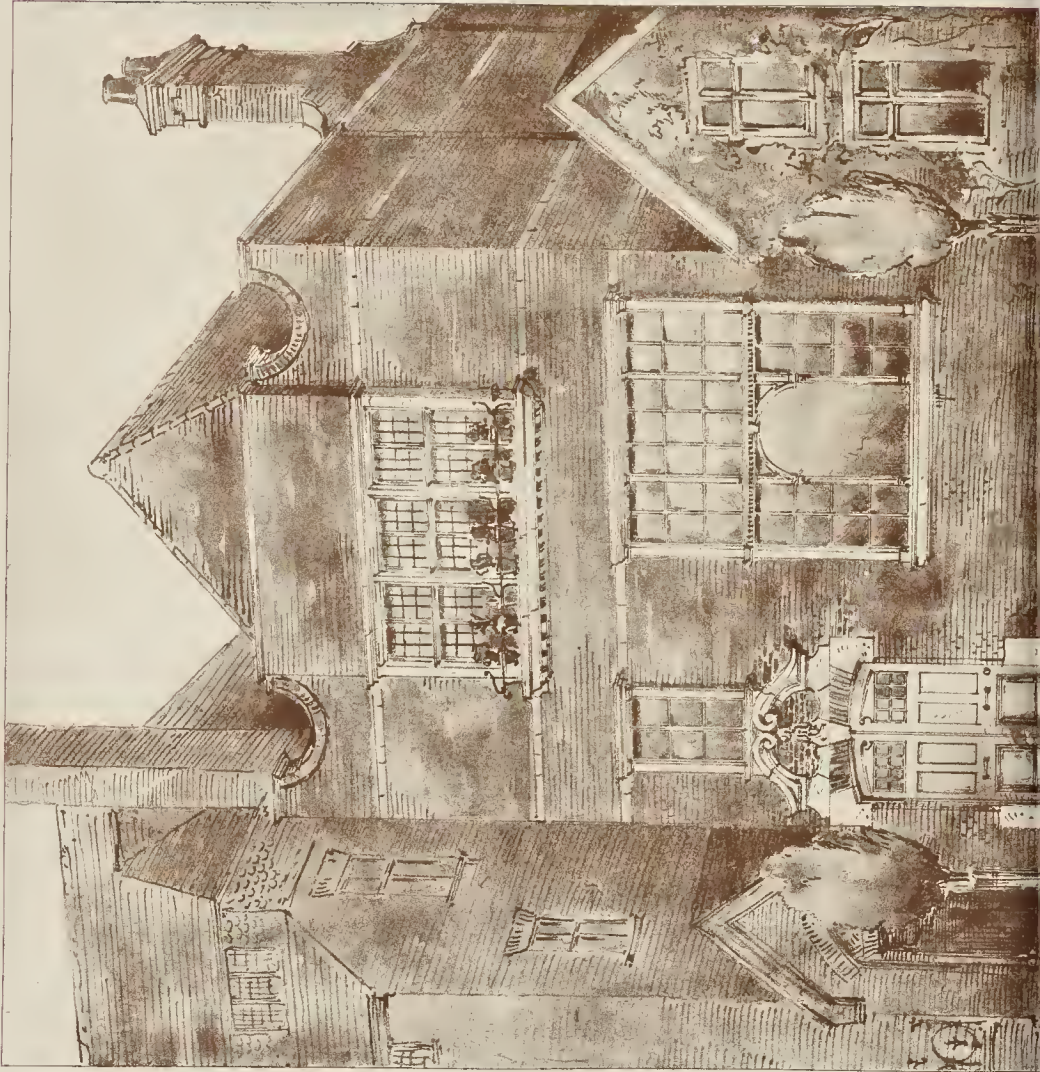


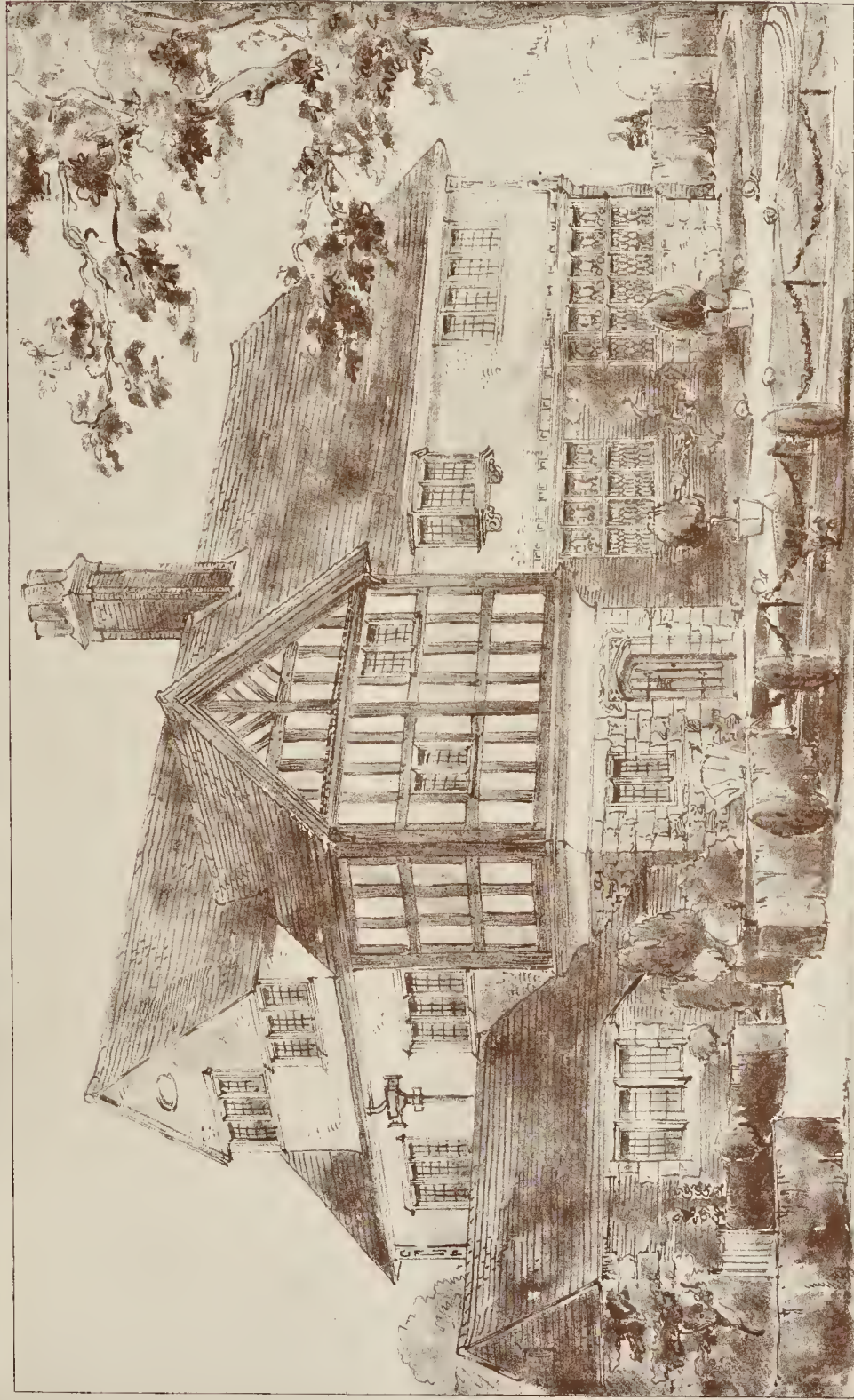
"The Mall."
South Lyfebel Manor.
near Poole. W.D. Caröe, M.A. archt.

PHOTO-LITHO SPRACUE & CO. 4-55 EAST HARBOUR STREET, LANS, E.C.



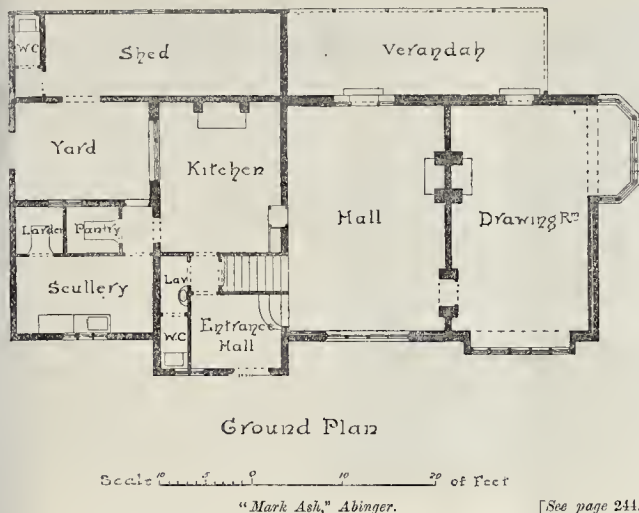
THE BUILDER, SEPTEMBER 24, 1892





INK PHOTO. SPRAGUE & CO. 48, 5, EAST MADISON STREET, CHICAGO, ILL. U.S.A.

"MARK ASH," ABINGER.—MR. JOHN BELCHER, F.R.I.B.A., ARCHITECT



Ground Plan

Scale 0 10 20 of Feet

"Mark Ash," Abinger.

[See page 244.]

THE SANITARY CONGRESS.

(Continued from p. 243.)

Col. Jones, V.C. (late R.E.) said the papers had struck out each a new line of its own. He was in favour of employing the laws of nature in every possible way, and therefore he welcomed and admired the ability displayed by Dr. Angell as a chemist. He had long ago experimented with "Polarite" and had been for a long time associated with General Scott, who had spent a great deal of time and money in trying to get rid of and convert to useful purposes the noxious stuff with which Dr. Angell had been experimenting. He could not fail, therefore, to be deeply interested. He was also deeply interested in Mr. Cooper's paper and diagrams. At last, in the Massachusetts experiments there was found an attempt to discriminate between the results of simple natural subsidence and those produced by chemical reagents. He would like to know from the London County Council what difference there would be in the results obtained by natural subsidence without chemicals and those obtained by the employment of 3 7 of lime and 1 0 of iron from which their chemist now claimed to have obtained important advantages over those obtained formerly with metropolitan sewage. He would suggest that the Sanitary Institute should memorialise the Council to give the results referred to.

Mr. Alderman Bolton (Burslem) and Mr. Rogers Field declared themselves partisans of the direct farm treatment of sewage. Major Laverock Flower (Lea Conservancy Board) called upon Mr. Scruby to treat by his process 1,000,000 gallons of sewage during the next six months and then come again to the Institute with his results. He strongly commended the efforts both of Mr. Cooper and Dr. Angell.

A vote of thanks was accorded to the three gentlemen who had presented these ingenious papers, and they were severally called upon to reply. Mr. Scruby simply claimed that his work should be put to a scientific test; and Mr. Cooper attacked Dr. Angell for the wonderful properties he claimed for polarite, which appeared, he said, to be like a policeman, able to stop the bad microbes and let the good ones pass on.

Dr. Angell, in his reply, said that Mr. Cooper had objected to his claiming for polarite that it had a power of bacteriological selection, or, as he ironically termed it, of performing the functions of a policeman, only arresting the bad germs and letting the good ones pass. The power of selection he (Dr. Angell) claimed for polarite was common to all porous bodies, but as polarite was the most porous of all known substances which are stable as well as soluble, the selective power in it was the greatest. Pasteur had shown that certain organisms were killed by oxygen in their passage through the air contained in fine pores, and as the oxygen contained in polarite was in the most active state or partially condensed, it was correspond-

ingly more fatal. But certain germs which M. Pasteur called acrobians, being fond of oxygen, passed through the pores unhurt, to do their duty of nitrification in the effluent water. In that respect the polarite was truly a policeman. With regard to the cement, he thought it could be made to a profit, even on so small a scale as five tons per day. He only required to use with the sludge 2 1/2 per cent. of animal matter.

This concluded the business of the section except the formal votes of thanks to the President, Mr. H. P. Boulnois, and the Vice-President, Major Laverock Flower, which were passed with cordial acclamation.

Purity of Air in Stables.

The last paper in Section III. was a very brief one by Veterinary-Surgeon Captain F. Smith (Army Veterinary School, Aldershot) on a "New Method of Determining the Purity of Air in Stables." Captain Smith's method is founded upon observations of the differences between the temperature of the air within the stable and that outside. As a rule, the greater the impurity, the greater the difference of temperature. A difference of from 3 degs. to 5 degs. Fahr. always accompanied air pollution. In the best ventilated stables the interior temperature was from only 1/4 deg. to 1 deg. higher than the exterior temperature. Remembering that a stable receives most of its warmth from the bodies of the animals living in it, the rationale of the method is easy to understand. The observations were made in the winter, and at night, when the stables were usually full.

There being no discussion, Dr. Russell proceeded to close the sitting by proposing votes of thanks to the readers of the various papers in Section III. A cordial vote of thanks was also given to Dr. Russell for presiding.

Concluding Proceedings.

In consequence of the absence of so many Congressists at Netley Hospital, Haslar Hospital, Southampton Waterworks, and other excursions projected, the general meeting with which a congress is usually brought to a close did not take place; but later in the evening a public meeting was held in the large room of the Town-hall, to which the working classes were specially invited.

Professor Corfield delivered a very interesting address. The Mayor of Portsmouth presided, and many of the chief officers of the Congress attended with a large audience of the general public.

In opening the proceedings, the Mayor offered to place at the disposal of any man of science, for the purpose of giving public sanitary lectures from time to time, the Grand Jury Room.

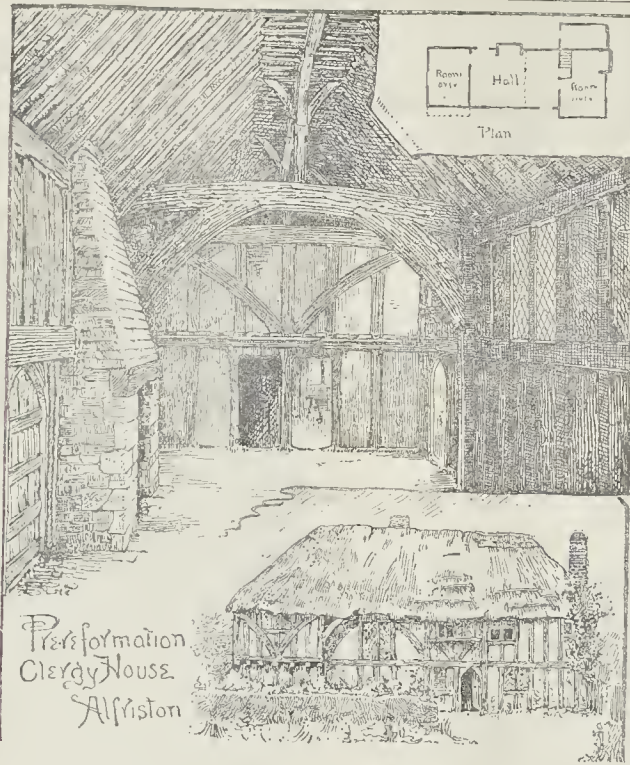
Dr. Corfield, who gave to his lecture the suggestive title, "Fall of Days," said the leading object in all Sanitary Congresses was to preserve health and prolong life. The art of preserving health or hygiene had been practised

with great success by the ancients, particularly the Romans, many vestiges of whose splendid engineering for the purposes of pure water-supply still remained. Yet it was the newest of sciences, and from the Romans we might even now take lessons, for even in our greatest cities we were content to take water which was known to have been polluted. That we had made progress was evident from the disappearance of the terrible scourges of plague and black death which so often prevailed in the sixteenth and seventeenth centuries. In turn, scoury and typhus, the scourges of the eighteenth and first part of the nineteenth centuries, had nearly disappeared, while against that other terror, small-pox, we were now well protected by vaccination. If they did their best by having cleanly, well-ventilated houses, nature would come to our aid in preserving health. The professor here interpolated a striking calculation which showed how if one person having an infectious disease in the first week of the year gave it to two others in the second week, and each of these were to give it to two others in the third week, and so on, each person giving it to only two, by the end of July the whole population of the world would have had it, and if it could go on at the same rate to the end of a year the people who would have had it would suffice to populate 4,500,000 worlds with a thousand million of people in each. This was an illustration of the fact that the forces which nature brought to bear towards the extinction of these infectious diseases were fortunately far more powerful than any we could employ. Referring to another disease of the more fatal kind, consumption, which should be classed among the preventible diseases, the way to prevent it was to have properly-drained sites on which to build our houses, to avoid overcrowding. It most prevailed in factories and other places where there was much dust, so that here again the question resolved itself into one of cleanliness. The practical advantage we had gained in this country by our devotion to the study of hygiene was a reduced death-rate.

Votes of thanks were accorded to Professor Corfield and to the Mayor, and the Congress was then formally closed.

Among the numerous excursions made, some of which have been mentioned, the most interesting were the visits of the engineers and the sanitary inspectors to the sewage outfall east of Portsmouth at Eastney, to the water company's works and reservoirs at Havant, Bedhampton, and Portsdown Hill, and that of the engineers to the Southampton Water Works. The sources of the water supply of Portsmouth are numerous, springs coming from the chalk, which by some are believed to be capable of yielding a possible supply of 200,000,000 of gallons per diem. The storage here consists of three or four acres of shallow reservoirs covering springs bubbling up from the chalk. At Bedhampton there is a spring called the "blue hole," on account of the beautiful tint of its water. Of course the actual supply falls far short of the possible supply, but 2,000,000 gallons daily are obtained without pumping, while 5,500,000 more per diem are obtained through the pumps. At Portsdown Hill between Havant and Southampton elevated reservoirs contain storage room for 7,000,000 or 8,000,000 gallons. From this point the whole population of the town and dockyard is supplied, the water flowing down by its own gravity and giving to a population of 160,000 the liberal supply of 34 gallons per diem. The mains run (in duplicate) from Portsdown Hill in 24-in., 20-in., 12-in., and 10-in. calibres, besides an extra 12-in. main, specially for the service of the Dockyard. The supply is constant for all purposes,—closets, of which there are 41,000 in the town, drains, and streets, as well as for the higher domestic purposes. The cost of the waterworks was about 400,000, on which the company always pays the full 10 per cent. dividend. It is proposed that the Corporation should take over the control of the water as so many other corporations have done, but, of course, they will have to give a much higher sum than 400,000, for them whenever they become purchasers.

RETIREMENT OF BELFAST HARBOUR ENGINEER.—We understand that Mr. Thomas Ross Salmoud, M.Inst.C.E., of Park House, Belfast, for upwards of twenty-one years chief engineer to the Belfast Harbour Commissioners, has now retired from the Board's service, but intends to act professionally as a consulting engineer and arbitrator.



OLD CLERGY HOUSE, ALFRISTON.

This old building is in danger of falling to pieces, for want of funds to carry out necessary repairs. It is a building erected in the fourteenth century, apparently of contemporary date with the adjoining church of St. Andrew, colloquially known as "the Cathedral of the South Downs." It is constructed of oak framing, with the interstices filled in with "wattle and daub." On plan it consists of a central hall (23 ft. by 17 ft.), the entire height of the building, with an open-timbered roof with large cambered tie-beams and moulded king posts. This hall was apparently used as a general living and reception room by the Medieval clergy. On either side of this hall are smaller rooms, two stories in height (the one end now temporarily used as a reading room), which were probably the dormitories and offices, &c.

The building was carefully examined in 1890 by an architect who has given special attention to timber-faced houses, and he estimates the cost of an entire preservation at about £450.

The Sussex Archaeological Society, at a general meeting, were "of opinion that every effort should be made to secure the preservation of so interesting an example as the old Vicarage House at Alfriston;" and the Vicar of Alfriston, the Rev. F. W. Benyon, is appealing to the public for funds to secure its preservation. Perhaps some of our readers may be able to assist in this good work.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

LOSELEY PARK AND COMPTON CHURCH.

ON Saturday last several members of the Architectural Association visited Loseley Park, near Guildford, under the direction of Mr. F. T. W. Goldsmith. Loseley is one of those interesting houses of the period of the English Renaissance which always form attractive features of the Association visits. We gave some account on the occasion of a former visit to the house by the Association (see *Builder*, July 23, 1887). We may add however one or two remarks to the details then given.

The plan of Loseley House is an interesting

example of the Elizabethan successor of the Medieval hall-type plan of residence. The hall, with its screens and gallery, still remains an important feature, but we have also as separate items the dining-room and the withdrawing-room or parlour, while the stair is now a pronounced and stately feature. In all of these, as in the first-floor chambers, there is a wealth of panelling, of plaster ceilings, and of rich and elaborate chimney-pieces. The drawing-room is the richest in detail, though here, as elsewhere, this is grotesque rather than graceful, rude rather than refined. Little old glass remains, though there is a representation of the arms of the Mores, with the date 1568, in one of the windows of the hall. Some painted panels, with the insignia of Henry VIII. and Katherine Parr, were probably brought from some other house, possibly Nonesuch, and inserted in the panelling here.

Not merely the house but the park also, and especially the garden, are replete of the sixteenth century, and the visitors were able to judge of the effect of a "formal garden" with picturesque garden houses, and clipped shrubs. A remarkably fine mulberry-tree probably dates from the time of the adoption of the punning motto of the Mores and the erection of the house. Of old furniture, too, of various dates, there are many examples, though not much of the period of the original house.

Leaving Loseley Park, the party then proceeded by a pleasant walk to the neighbouring Church of St. Nicholas, Compton, a small and simple south-country church, with shingle-covered broach spire, that from the outside has little to distinguish it from many others. Internally, however, it possesses a feature probably unique. The eastern end of the chancel is in two stories, and as the detail is of Late Norman or Transitional character, there is little doubt that the arrangement is original. The lower story forms the sanctuary, some 11 ft. square, vaulted with a massive-ribbed quadripartite vault and open towards the west with a rich Late Norman semicircular arch. Above this arch, and railing off the upper floor over the vaulting, is a wooden balustrade of somewhat slender shafts carrying semicircular arches, as to which there can be little doubt that it is of twelfth-century date, and coeval with the main fabric of the church. The upper

story of the sanctuary is, like the lower, open to the chancel and church, and in both cases a piscina exists in the south wall, with every appearance of being original. There can, therefore, be no question that it was intended that those in the church should be able to participate in the worship carried on both above and below. This seems to indicate that we have here an original attempt to combine, in a somewhat different manner to that usually adopted, the functions of a crypt and upper chancel. The use of crypts open to the church was, as we know, very general in western Christendom prior to the middle ages, and it is therefore highly probable that we have here simply what we may call an instance of a crypt at a high level, so to speak. Additional colour is lent to this hypothesis by the existence of a very early tomb on the north wall of the lower sanctuary, thus strengthening the inference that this was of the nature of a *confessio*. The upper sanctuary is now lighted by a modern Decorated window, but in old illustrations prior to the restoration of 1843, a three-light window with semi-circular heads is shown. We may note that the account of Compton in Domesday Book says, "There is the church," which speaks for the antiquity of the foundation. The altar-rail is interesting and of good seventeenth-century design as is also the screen which formerly acted as a chancel-screen, but is now relegated to the western end of the church.

COMPETITIONS.

NEW CHURCH, ABBEYDALE, YORKSHIRE.—A meeting of the Abbeydale Church Extension Scheme Committee was held on the 14th inst. to select the plans for the projected new church. The plans had been previously submitted to Mr. Ewan Christian, Consulting Architect to the Ecclesiastical Commissioners, for his advice and opinion. The committee chose the plans of Mr. Joseph Norton, of Sheffield, which had been favourably mentioned by Mr. Christian. The new church is to provide seating accommodation for 750 people. It will be built of stone, in the Early English style, and will cost £1,000.

GORING-ON-THAMES, OXON.—A limited competition was decided last week for a new chapel at Goring adjoining the present one. The selected design, by "Independent," shows an Elizabethan building treated in such a manner to suit the peculiarities of the site. The authors are Messrs. Cooper & Howell, of Reading, who have received instructions to proceed with the work.

BOARD SCHOOLS, SALFORD.—The monthly meeting of the Salford School Board was held on the 19th inst. at the Salford Town Hall Buildings. On the motion of the Chairman the Board adopted a report of the General Purposes Committee: That they had carefully considered the eight sets of plans sent in for the erection of the new John-street School, and that, after consulting with Mr. Edward Salomons, they were of opinion that the plans submitted by Mr. Henry Lord, of Manchester, best met the requirements of the Board, and provided sufficient accommodation after allowing for wasted space. The recommendation of the Committee on this point was agreed to. The architects for the proposed enlargement of the St. Margaret's School were Messrs. Woodhouse & Willoughby, of Manchester, chosen from the eight competing firms. For the enlargement of Ordsall Schools Mr. Henry Lord was instructed to prepare plans.

NEW WORKHOUSE AT PATRICKCROFT.—The Guardians of the Barton-upon-Irwell Union for some years have had strong pressure brought upon them by the Local Government Board to erect a new workhouse, and make better provision for the sick and aged paupers, and also for the imbeciles. They some time ago purchased the old mills belonging to Messrs. Waddingtons, which adjoined the present workhouse, and, having made arrangement to erect the new buildings by instalment, have let the contract for the largest portion of the buildings for aged and infirm pavilions for the administration buildings to Messrs. Southern & Sons, of Manchester, for the sum of 16,250l. When these pavilions are completed, they will be temporarily occupied by the inmates now in the hospital until the new building for them is erected upon the site of the old hospital buildings. The total accommodation when completed will be about 500 inmates. Messrs. Mangial & Littlewoods, of Manchester, are the architects whose plans were recommended by the Local Board from competition designs by several architects.

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ARCHITECTURE.

SIR,—The experience gained in some years of pleasant association with various future practitioners leads me in no doubt about the value to the student of an *intelligent* examination. It lays down for him a useful course of study, and gives emulation and a purpose to his work.

What would a University course be worth if even the best intentioned men went up for three years' work with no defined standard to be reached, no boundaries to be passed, or prizes to be taken?

Why should the embryo architect be left to develop his own genius, if perchance he is one of the few with heaven-born instinct?

The examination is not to test how far he is an artist in his craft, but whether he has had the necessary grounding and drilling, without which the artist's inspiration is worth little in any branch of the Arts.

If an examination is accepted, may we not consider that a distinction should be drawn between a "design" intended to represent architecture, and an executed work which may be "architecture?" A student may be examined in design, as a test of his capacity to put his ideas on paper, or, in other words, to express himself grammatically. Confined to these lines there would be no examination in "art," and no inconsistency in maintaining that in the election of Fellows a general consensus of opinion on the quality of the candidate's work should be sufficient.

The latter expression of opinion should be insisted upon, and the Institute should relinquish the custom of admitting any respectable father of a family, however damnable his productions.

ERNEST GEORGE.

SIR,—The letters you publish from Mr. Belcher and Mr. Brydon relate solely to the internal economy of the Royal Institute of British Architects, and would not have justified any notice from those who do not belong to that body had it not been for your leading article last week.

You remark that it is at all events possible to understand what those gentlemen want, which is hardly the case in regard to the outside dissentients. You go on to say that we outsiders,—the memorialists,—have demanded that the Institute should accept our views, and that as it will not do so we "ent the connexion" and abuse it.

May I be allowed to point out that this description does not, so far as I can judge, in the least explain our attitude? You say it is impossible to understand what we want. This is but natural, because we do not want anything. We do not want to be examined, labelled, certificated, and registered. We do not want to be pronounced gentlemen by Act of Parliament. We do not want to enjoy any legal privileges or monopolies, or to shunt out other people from employment. It is not we who are the aggressors in this dispute. We only ask to be left alone and allowed to go on as we are. These questions are not of our raising, and because when they are raised and forced upon us we try to show that the interference of the Legislature with our liberty will do no good, but rather a great deal of harm, it is a little unfair to turn upon us and ask what then is it that we do want. We have never asked for anything.

It is just the same with our attitude towards the Royal Institute of British Architects. We have never "demanded that the Institute should accept our views." It is quite free to go on with its examinations so far as we are concerned, provided it keeps them to itself. Our opposition begins only when the Institute attempts to force them on to all who aspire to be architects, and to do in its own way what the registrars and the old footing had the opportunity of doing very useful work. Its prizes, scholarships, library, and lectures were excellent. As a club or society of architects for discussion and mutual improvement, there was plenty of useful work before it. It is only when the Institute attempts to pose as a *censores artem*, and to pronounce on the fitness or unfitness of a man to practise architecture,—when it claims the right to sweep us all into its net, and quarrels with us because we object to be swept up, and do not value its *imprimatur*,—that we first feel the stirrings of resentment. Here again we

object to the quarrel being fastened upon us. We made no demands upon the Institute, and simply defend ourselves against invasion. Let the Institute close its barriers, and pile examination on examination as much as it pleases, so long as it gives up its pretensions to represent architecture, and we shall not complain.

How its present policy will affect the Institute it is not difficult to foresee. It will prevent young men who view architecture seriously from joining its ranks or remaining if they are members. By the recent resignation of Messrs. Reginald Blomfield, May, Macartney, Horsley, Simpson, Newton, and Prior, the Institute has lost its men of the greatest promise. If its present policy is persevered in a further secession may be looked for, and the Institute will become more and more what some say it is already in a great measure,—the home of the surveyor-architect, the mere man of business.

May I, in conclusion, point out the unfair use that has been made in the present controversy of the word "surveyor?" Surveyor, in its old sense, meant the man who designed the building and surveyed,—that is, supervised,—its performance. He was, in fact, the architect, as we now call him. The word "surveyor" now means something else; and it surely cannot be seriously maintained that because Wren was spoken of as a surveyor, therefore the "Light and Air" men are architects.

THOS. G. JACKSON.

SIR,—The letters of Mr. Belcher and Mr. Brydon, and your very temperate and just article occasioned by them, will serve to recall the thoughts of your readers to subjects which occupied a good deal of attention last session. On some of those subjects I hope to speak in the public lecture which I customarily give at the commencement of my course at University College; but the question of the mode of electing Fellows of the Institute is one on which I shall be glad to be allowed space in your columns for a few remarks.

In your article you say that "we believe some members of the Institute contemplate even an examination test for Fellows" apart from the idea of electing them only from among the Associates. A provision of the new charter contemplates this test as at any rate possible; and the "some members" who advocate the idea will, I believe, be found to include some very energetic and influential men. I wish to deprecate the step very strongly.

An examination following closely upon a course of study may be so framed as to give tolerably good evidence that the student has, or has not, profited to a reasonable extent by that course. An examination conducted like those at the Institute, or those of London University, by examiners who have not even the teachers of the candidates, cannot go even so far. The latter class of examination shows little or nothing more than that at the moment of presenting himself a candidate is or is not possessed of certain information; and I have had enough experience of both sorts of examination to justify my speaking with some confidence. I contend that examining a candidate for the rank of F.R.I.B.A. is not at all the sort of precaution which ought to be taken, and procedure which ought to be followed, in order to be sure that a professional man is a fit person to hold the rank of a senior member of the professional society connected with his calling. Not only would the adoption of such an examination as a preliminary to electing Fellows be, as you put it, taking up a position which has never been taken by a corporate society similar to the Institute before, but it would be a suicidal policy. The professional man of fair repute, long experience, and tried skill will not usually feel disposed to submit himself to a disagreeable ordeal for the sake of attaining a rank in the Institute which he ought to step into as a matter of course. It will not be worth his while. It will be the keen, clever, pushing, and possibly not over-scrupulous man, to whom attaining Fellowship would be something like changing into a better suit of clothes from a shabby one, who will gladly take the trouble to coach up for and pass any kind of examination which will give him (as the Association examination is now felt to do) a claim to be treated with forbearance at the ballot-box. To these objections the scheme of selecting Fellows from the ranks of the Associates is not open; and that scheme has the

incidental advantage that it will give additional value to the existing examinations.

The question would remain, were such a scheme adopted, how best to provide an admission to Fellowship in exceptional cases; that is to say, how to elect architects who have not passed through the stage of Associateship, and who yet ought to be Fellows; and for one would be quite willing to see such admission made much more difficult than it now is. It appears, on the whole, desirable to make such a mode of entering the ranks of Fellows possible but exceptional. I beg to suggest, as a convenient mode of procedure, that it should be arranged that a memorial signed by architects, or others, should first be addressed to the Council representing that A. B. desired to offer himself for election, and setting forth the special circumstances and reasons why, in the judgment of the memorialists, he should be allowed to do so; and that this memorial should be supported by any evidence of any sort,—drawings, photographs, literature, expressions of opinion, which the memorialists like to adduce. If the Council, after judging of the memorial, and the means of forming an opinion possessed by those who signed it, and the value of the evidence adduced in support of it, decides to grant the request of the memorial, then the candidature and election should proceed as now; only that the memorial and all the evidence in support of it should lie on the table of the Institute, and be summarised in its Proceedings. If this course is adopted, it will not often be had recourse to, and that only in the case of men whom the Institute would not like to lose. The rule as to seven years' practice would then be, of course, abolished.

T. ROGER SMITH.

SIR,—In this most interesting and valuable correspondence everything seems to turn on the meaning of words, especially "architect" and "architecture," and, at the bottom of the controversy, "What qualifications should enable a gentleman to call himself an architect?"

The most interesting work on the subject, and that which, by the nature of the publication, should be an authority and carry weight with all our members, is the "Dictionary of Architecture." Under the article "Architect" is this:—

"In the modern acceptance of the term, an architect is one who both furnishes the designs and superintends the execution of buildings. However graceful and artistic the design which the architect may produce, he is at the best a mere draftsman unless he possesses the practical knowledge necessary to enable him to carry them into effect, while the builder who may have ability and experience sufficient to erect an ordinary building planned by himself cannot with any propriety assume the title of architect unless he also possess taste, invention, and a thorough acquaintance with the style he may have adapted.

To acquire a leading position in his profession the architect must display integrity, &c., combined with the various acquirements indicated in the Article 'Architecture.'

That is, you cannot with any propriety assume the title of architect unless you are a practical builder who has studied (as well) the art of architecture and acquired, by the possession of creative genius, the faculty of designing and adapting the art of architecture to every-day building of every kind.

Also if it is your practice to use your own skill, as enumerated above, in designing the building work with which you may be entrusted, and are and behave as an honest man in whom your client can have perfect faith, then and then only you are entitled "with propriety" to call yourself a professional architect; otherwise, call yourself what you may, without all these qualifications you are nothing more than a consulting building expert, and I would suggest that it is the Institute's failure to recognise these facts that the present crisis exists.

This crisis (alluded to by others) is, I believe, that many members intend that our Society shall reform, for they consider that it has been and is thoroughly ignoring the greatest of all qualifications that signify the term "Architect."

It is generally known that many men have contemplated resigning, but have been induced to remain in the Society and help to change things for the better and, if possible, so to alter and direct its present policy that many of its members who have recently resigned may be induced to join its ranks again.

The following are some of the reforms I think might tend to this end:—

1. The examination to be re-named an examination in building.
2. A re-arrangement of the classes, and instead of in future creating any more Fellows as at present, to have two classes in its place, viz., "Architect Fellows" and "Surveyor Fellows." The only difference between them being that the former would be required to submit photographs and working drawings of some of the buildings they have executed, which would have to pass a special committee and be exhibited for voting on by the electorate. It must be borne in mind that the framers of the Charter seem to have contemplated

something like this, for in it they distinctly provide for the creation of new classes of subscribing members.

3. A representative Committee to define and publish the qualifications and duties of gentlemen connected as architects or surveyors with the business of building, for our Society must always have good honest professional men among its members capable of everything except architecture. Surely surveyor is good enough title for these gentlemen, but new definitions of the words as understood to-day should be published, for in old days, and even at the present day, in special cases the term architect and surveyor are synonymous.

4. A re-christening of the Institute either as an "Institute of Architecture," as Mr. T. G. Jackson suggested, or an "Institute of Architects and Surveyors."

There are other minor matters, but to me these are largely at the bottom of the difficulty.
SYDNEY VACHER.

VESTRIES AND HOUSE DRAINAGE.

SIR,—Referring to your article of last week, re Vestry regulations and house drainage, it may surprise some of your readers to hear that the Vestry of Camberwell forbid the use of properly-coated iron drain-pipes, not, I have been told, because their officers object to them, but because they cannot depart from a set of hard-and-fast regulations passed by the Local Government Board.

I have had over sixteen years' study and practical experience in sanitary work, and having noticed the way in which, as you point out, properly-coated iron drain-pipes have been coming into vogue, I cannot see the justice of Vestry Regulations boycotting them by permission of the Local Government Board and a number of vestries are not yet aware that the Office of Works are large users of these pipes.
A. HENRY FRIEND.

The Student's Column.

CONCRETE.—XIII.

WATER.

WATER is necessary for the setting and hardening of hydraulic limes and cements. It does not form a merely mechanical mixture with these in the way it does with pure hydrate of lime, but it unites chemically with them, as we have already seen, forming new compounds of an indurating nature. It is evident, therefore, that the quantity of water added to cement or hydraulic lime is of no little importance. If too little be used, some of the cement remains more or less in the form of powder and cannot attain to that cohesive and adhesive strength for which it was intended; and the mortar or concrete is pervious to moisture, and therefore more liable to destruction by frost and atmospheric agencies. On the other hand, there is no doubt that an excess of water is injurious to the strength of the cement, whether neat or mixed with sand. The water is scattered in little globules throughout the paste, and around these the cement sets; gradually the water evaporates, and on the briquette being broken, little globular cells, in which the water-drops had lain, are disclosed, and are seen at once to be a source of weakness. Excess of water also retards the hardening of the concrete, and there is the further danger that it may wash away some of the finest and best particles of the cement during the operation of mixing with sand and other material.

In Chapter XI., Table XV., we gave the quantities of water used in Germany in making test briquettes, both neat and with sand. For neat cement, about 25 per cent. (by weight) of water is used. But we must remember that this is for making briquettes in laboratories, where, if it may be expected, no water will be allowed to run to waste or be lost by evaporation, and where none will be absorbed by any surfaces with which the briquettes come in contact. This is vastly different from the conditions which obtain in practice, where water may drain away from foundations into the ground, or drip through the centre of floors, or be evaporated by the heat of the sun, or dried by passing winds.

Gillmore is of opinion that concrete, "when ready for use, should appear quite incoherent, containing water, however, in such quantities that a thorough and hard ramming will produce a thin film of free water upon the surface under the rammer without causing in the mass a gelatinous or quicksand motion."

Mr. H. K. Bamber says that good cement requires for its thorough induration 40 lbs. (i.e., 2 gallons) per cubic foot of cement. If we take the

weight of such a cement at 112 lbs. per bushel, or 87 lbs. per cubic foot, it will be seen that he advocates the use of 46 per cent. (by weight) of water with cement. This is so much in excess of any other quantity which we have seen advocated for neat cement that we think Mr. Bamber must refer to cement when used in concrete with materials which are, of course, more or less absorbent. Some experiments made by him in 1889 and 1890 are, however, of considerable interest in this connexion.* He made six blocks of concrete, all consisting of one part new Portland cement, 2 parts sand, and 4 parts shingle. Two of these (A) were made with the "full quantity of water that the cement would take up," namely, 10 lbs.; two (B) were made with $7\frac{1}{2}$ lbs. of water; and two (C) with only 5 lbs. They were allowed to harden for two weeks, and then one of each kind was placed on a sea-wall, where they remained for a year, being covered and uncovered every tide. They were then taken and broken through the middle. The block (A) was "very hard and perfectly sound and dry quite through to the surface;" (B) was "dry in the middle, but on every side the water had penetrated about 3 in. and had much weakened the block;" (C) was "wet quite through, and was very easily broken up, the water having been able to percolate continually through the block, and having dissolved much of the lime." The other three blocks were kept in fresh water for twelve months "with exactly similar results as to penetration of water and strength of blocks," but the water in which block (A) was immersed "remained clear," that containing (B) "became milky and turbid from the formation of carbonate of lime," and that containing (C) "became quite white, and . . . the whole block was covered with crystals of carbonate of lime, $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in thickness. The lime had been gradually dissolved, and crystallised on the surface in the form of carbonate of lime."

It is now generally conceded that it is better to use too much water than too little, but it is best, of course, to use the right quantity, that concrete requires from 21 to 23 gallons per cubic yard. Mr. A. E. Carey said at the Institution of Civil Engineers (1891) that he had obtained the best results by using about 22 gallons of water per cubic yard of raw materials, or about 1 part by volume to $7\frac{1}{2}$ or 8 parts, "less than this not securing that glassy surface upon the surface of work which is so desirable, and more than this, washing away some portion of the soluble alumina silicates [sic] which are the active ingredients in concrete." He found the crushing strength of small cubes (about $1\frac{1}{2}$ in. each way) to be as follows:—

TABLE XVII.
Weakness of Cement mixed with insufficient Water.

Cement.	Normal Sand.	Fresh Water.	lbs. per sq. in.
per cent.			
1	3	20	1679
1	3	10	1425 (average).

Fresh cement will take up more water than stale cement. A smaller quantity of water can be used in concrete if this be well rammed.

Another experiment which Mr. Bamber made inclodes a useful lesson. A box 18 in. cube, containing, therefore, 5,832 cubic inches, was completely filled by the mass of concrete which resulted from the mixing of the following ingredients, measured separately:—1,296 cubic inches sharp sand, 5,184 cubic inches shingle, and 30 lbs., or 829 cubic inches water. These ingredients, not including the water, have an aggregate measurement of 9,072 cubic inches, but on being mixed together the voids in the larger material were filled by the smaller to such an extent that a shrinkage of 3,240 cubic inches took place. Exactly the same quantities of cement, sand, and shingle were mixed with 15 lbs., or 415 cubic inches, of water, with the surprising result that the box would only contain seven-eighths of the mixture; in other words, the ingredients, on being mixed together, shrank only about 2,407 cubic inches. The voids, or interstices in the latter concrete therefore exceeded those in the former by about 833 cubic inches. This shows that concrete mixed with its full quantity of water is more dense, and therefore less permeable to water, than concrete made with an insufficient quantity. There is this also to

* See Proceedings Institution of Civil Engineers, Vol. CVII. (1891-2), Part I.

be said in favour of erring a little on the side of excess rather than insufficiency, that good cement has the property of exuding surplus moisture to a considerable extent in the process of setting. And some excess, as we have already said, must be provided in order to make up for loss of moisture, which may occur through contact with dry absorbent surfaces, such as the wood staving under a floor or roof, and the earth or gravel in many foundations, and again through evaporation. In many cases, the injurious loss of moisture by evaporation is prevented by covering the concrete for a week or more with a shallow pool of water, or with a layer of sand or sawdust kept continually moist, or with straw, sacks, &c., which protect the concrete from the direct action of the sun's rays and of wind. Table III., Chapter III., showed that briquettes of various hydraulic limes and sand kept in water (after having set in air), are from 30 to 105 per cent. stronger than similar briquettes kept in air, while the strength of Portland cement is approximately the same in both cases. Concrete, however, deposited in water is invariably weaker than concrete which has set in air. Concrete, even of Portland cement, exposed to a dry atmosphere, and especially to a dry warm atmosphere, cannot attain its proper strength, so that even this, although it does not suffer perhaps to the extent to which hydraulic limes suffer, is injured by lack of moisture during the process of setting.

We ought not to omit to mention the fact that all aggregates are more or less absorbent, and that some of them, especially coke-breeze and the like, if used dry, greatly injure concrete made with them by drawing from the mixture the water necessary for the proper hardening of the cement. In order to prevent this, all aggregates ought to be moistened before being made into concrete; the process of washing the aggregate effects this, and is, therefore, most useful and economical when carried out immediately before the aggregate is mixed with the cement. This proper moistening of the aggregate is a matter of great importance.

Mud of any kind, held in suspension by the water, is detrimental to the concrete made with it. Mr. Carey found that briquettes made with a certain kind of cement, mixed with 20 per cent. of distilled water, required three hours to set, and at the end of seven days had an average tensile strength of 480 lbs. per sq. inch, while other briquettes, similar in every respect, except that 1 per cent. (by volume) of dried and finely-powdered Thames mud was mixed with the water, took four hours to set, and broke with 411 lbs., that is to say, over 14 per cent. less than those mixed with pure water.

Water containing organic matter is also more or less injurious, and consequently green and stagnant pools ought not to be used for mixing in concrete.

But not only is mud or other matter held in suspension by the water injurious to the cement with which it is mixed; matters dissolved in the water also may prove harmful. Such substances as sugar, soda, and salt are, in frosty weather, sometimes dissolved in the water used for making concrete, either for the purpose of lowering the freezing point of the mixture and so allowing it to be manipulated at a time when fresh water would be frozen solid, or for the purpose of preventing or, at any rate, minimising the damage which might possibly be caused to the concrete by frost coming before it had set sufficiently. Until there is more information on the subject, we shall be justified in believing that Portland cement is ultimately strongest when mixed with distilled water and nothing else; all additions, whether of mud, or sand, or ordinary aggregates, or of sugar, salt, or other dissolved substances, are a source of weakness. The use of sugar, however, with fat limes, and probably with hydraulic limes and natural cements, is attended with advantage. The increase of strength caused by adding a small quantity of sulphuric acid to fat and hydraulic limes has already been shown in the chapter on Selenitic limes, and the disadvantage of adding it to Portland cement has also been mentioned.

The strength of cement does not differ very much whether it be gauged with fresh water or with sea-water. Apparently the sea-water briquettes are the stronger at early dates; but after a few months the fresh water ones take the lead, and continue to give the best results. It must be said, however, that experiments are somewhat contradictory on this point. Mr.

M. J. Powers in America has tested 3,500 briquettes made from seven kinds of cement, with the object of ascertaining the influence of sea-water. He found that the strength of both natural and Portland cements mixed with salt-water was, at the end of one month, 30 per cent. more than when mixed with fresh water, but this gain of strength was found to vanish during the second month in the natural cements, and during the third month in Portland cements; therefore the fresh-water briquettes having the advantage. His conclusions are that "there can be no doubt that cement mixed with sea-water gains considerably in strength during the first few weeks, but that it does not hold out as clearly shown by these results. The gain also seems to be greater and more permanent with the Portland than with the natural cements. The effect of using a 10 per cent. solution seems not so good as with a 3 per cent. solution." Some experiments by Mr. Carey show little variation in the strength of briquettes, whether ganged with—1, fresh water; 2, half distilled water and half sea-water; 3, quarter distilled water and three-quarters sea-water; 4, sea-water, 25 per cent. evaporated; 5, sea-water, 50 per cent. evaporated. The greatest difference at one month was 3.2 per cent., 4 being strongest; at two months 4 per cent., 4 again strongest; at three months 26 per cent., 5 being strongest and 4 weakest; at six months 35 per cent., 1 strongest and 4 weakest; at nine months 8.2 per cent., 5 being strongest and 4 weakest; and at twelve months, 27 per cent., the following being the tensile strengths in lbs. per square inch at this date,—1, 678; 4, 605; 2, 592; 3, 575; and 5, 495. It will be seen that the fresh water briquettes come to the front at the end of a year, but the results of the various tests are so strange and irrational that we cannot attach much importance to them. The tests by Mr. Powers are more likely to be accurate.

Cement ganged with sea-water sets more slowly than fresh water. Sea-water has the advantage of having a lower freezing-point than fresh water, and work can, therefore, be carried on with it at times when fresh water would be frozen. It ought not, however, to be used in the walls of buildings or in stucco, as it has the property of attracting moisture, and of causing an efflorescence on the surface of the material with which it has been mixed. Again, sea-water ought not to be used in concrete which will come in contact with ammonia, as in the paving of stables, shippens, chemical works, &c. But for foundations, retaining walls, and similar work sea-water may be used instead of fresh, if more convenient. Sometimes, especially in winter, warm water is used for concrete, but is of doubtful advantage as far as strength is concerned. It has, however, the effect of causing the cement to set sooner, and for that reason it may, in certain cases, be employed.

GENERAL BUILDING NEWS.

THE REPAIRS TO LINTHGOUGH PALACE.—The alterations and repairs to Lintlough Palace, carried out by Mr. R. Philip, are now, says the *Scotsman*, completed. The principal parts on which improvement has been effected are the King's kitchen, Old Parliament hall, Chapel-Royal, priest's residence, and "The Confessional." The floors have been laid with concrete of a reddish tint. According to the terms of the Government grant, further repairs will be made next season, when, it is expected, a fountain will be erected in the grounds.

RESTORATION OF PARISH CHURCH, LANTHONY (MONMOUTHSHIRE).—The parish church within the precincts of old Lanthony Abbey is to be restored. Mr. J. James Spencer, of Aberavenny, is the architect. Most visitors to the ruins know of the dilapidated state the church is in. Funds are much wanted to carry out the work, as only a very small sum can be raised in the parish.

NEW CHURCH, SMALL HEATH, WORCESTERSHIRE.—On the 17th inst. the foundation-stone of the new church of St. Oswald, in course of erection at Small Heath, was laid by Mrs. C. Wriothley Digby. The architect is Mr. W. H. Bidlake, M.A., of Birmingham, and the church will consist of a chancel, a nave, and aisle of six bays. On the north side of the chancel there will be an organ-chamber and clergy-vestry, balanced on the south side by a transept and the choir vestry, the two vestries being connected by a passage behind the altar. The walls will be finished in Leicester sand-brick, with Bath stone dressings, the nave piers will be of Hopton stone, and the roofs tiled. The style adopted is the Transition from Early English to Gothic as described. The portion of the work at present undertaken consists of the whole east end and four bays of the nave and aisles, with a

temporary west front, leaving the two remaining bays with the tower and spire for a future effort. Mr. T. Rowthorn, of Small Heath, is the contractor, and the estimate is £323. The portion of the church now in progress of erection will accommodate 400 worshippers.

NEW SYNAGOGUE AT HAMSTEAD.—A new synagogue, situated in Dennington Park-road, West Hamstead, was consecrated by the Chief Rabbi on the 18th inst. The synagogue has been built by Messrs. John Allen & Sons, from the designs of the architect, Mr. Delissa Joseph. The principal elevation, which is Romanesque in character, has been carried out in red brick and red stone, and comprises a central tower flanked by secondary towers, containing the staircases. The building is provided with seven exits, all the doors of which open outwards. The main building is in the form of an octagon, the corners of which are occupied by columns carrying the gallery, and from the tops of the columns spring the ribs which form the dome, which is constructed of steel. The gallery is placed in the aisles, which follow the lines of the octagon. The ark, which is in the form of a domed temple, is placed in an apse recessed from the eastern side of the octagon. The choir is at the back of the ark, the voices reaching the synagogue through wrought-iron grilles. Immediately in front of the ark platform is the reader's platform, reached by two staircases, describing quarter circles, the pulpit being in front of the reader's platform. Cloak-room accommodation is provided at each level. The scheme of decoration is pure white throughout. The building is lighted by two ranges of windows and by clearstory lights. The capacity of the building is for 650 sittings, and it has cost about 11,000.

METHODIST CHAPEL, HORSNEY.—Memorial-stones were laid on the 15th inst. of a new Methodist Chapel, situated in the Willoughby and Hampden-roads, Horsney. The internal dimensions of the new chapel will be 58 ft. 8 in. by 51 ft. 3 in. Mr. Robert Curwen, of Palmerston-buildings, is the architect. In addition to the chapel are to be built an infant class-room, additional vestries, and a chapel-keeper's house; the whole group being estimated to cost 9,000.

ADDITIONS TO THE STAFFORDSHIRE GENERAL INFIRMARY.—The erection of the new north wing to the Staffordshire General Infirmary is being rapidly proceeded with. The walls, says the *Staffordshire Advertiser*, are now all but completed. The architect is Mr. Aston Webb, of London, and the contractor is Mr. F. Espley. Mr. H. T. Peoworth is clerk of the works.

EXTENSION OF THE CLINICAL HOSPITAL, MANCHESTER.—The new wing of the Clinical Hospital for Women and Children, Park-place, Cheetham Hill-road, Manchester, was opened on the 19th inst. for the accommodation of out-patients. The wing has been built upon the site formerly occupied by two dwelling-houses adjoining the main hospital building, and fronting Cheetham Hill-road. Among the apartments are a waiting-hall, a range of dispensaries, and the necessary consulting-rooms for the surgical staff. Messrs. Mangnall & Littlewood, of Manchester, designed the building.

RESTORATION OF ST. AUGUSTINE'S CHURCH, NORWICH.—St. Augustine's Church, Norwich, which for many months past has been in the hands of the builders for purposes of renovation, was re-opened on the 11th inst. The church, according to the *Norwich Mercury*, underwent a partial restoration in 1879. In that year it was re-seated with pitch pine, the chancel roof was renewed, and a ringing floor built in the tower. Little else was done owing to lack of funds. Last year the parishioners were reminded of the dilapidated condition of the church when several windows were blown in. In December last a new east window was inserted, and about the same time a carved oak rood was erected by Mrs. Hotblack. During the present year fresh windows have been provided. New buttresses have been built; the plaster cement, which for the past 150 years has covered the outside walls of both nave and chancel, has been picked, revealing a surface of ordinary flint stones, a new south porch has been put up, and the church has been drained. The designs, prepared by the late diocesan architect, Mr. R. M. Phipson, and partially executed twelve years ago, are now finally carried out.

NEW MALTINGS AT NEWARK.—New maltings are about to be erected at Newark for Sir W. Gilsart, Bart. The buildings will occupy a site between Cow-lane Wharf and Northgate, adjoining the Wellington Foundry, and will comprise three malt-kilns, a barley-drying kiln, and malt and barley stores. Messrs. T. G. Mackenzie & Sons, of Newark, have secured the contract for the erection of the maltings, and the sub-contractors for the brick and stone work are Messrs. George Brown & Son, also of Newark. The amount of the tender was 21,675. Messrs. Evans & Tolley, of Nottingham, are the architects, and Mr. Charles Kendall is to be clerk of the works.

SURVEYORSHIP.—Mr. F. Wood, C.E., Assistant to the Borough Engineer of Leicester, has been appointed by the General Works Committee of the City of Wakefield to the position of Assistant Surveyor, who is to carry out the sewerage and sewage disposal schemes for that city.

SANITARY AND ENGINEERING NEWS.

EASTWOOD AND GREASLEY SEWERAGE.—In December last the Barford Rural Sanitary Authority sanctioned the appointment of a local committee to consider the best means for the disposal of the sewage of Eastwood and Greasley, and they decided that Mr. Herbert Walker and Mr. W. H. Balfour, civil engineers, both of Nottingham, should be invited to submit plans and the committee to decide which was most suitable. These plans were submitted last March, and, after an inquiry into the merits of both schemes, the committee recommended that Mr. Herbert Walker be appointed the engineer to carry out the proposed works. The system advocated by him is that known as the "International," and the Rural Sanitary Authority appointed a deputation to visit certain places where this system is in operation, and they were so satisfied with what they saw of the results of this process that the Authority unanimously accepted the report of the committee, and Mr. Walker was appointed the engineer for the undertaking. Plans will be submitted for approval by the Local Government Board in due course.

THE CARDIFF WATER SUPPLY.—On the 14th inst., Alderman David Jones, Chairman of the Waterworks Committee of the Cardiff Corporation, opened a new reservoir near to the Brecon Beacons for supplying the town with water. The reservoir is one of three which the Corporation in 1834 obtained power to construct in Taff Fawr Valley, 32 miles from Cardiff. It has been six and a half years in construction, and has cost 374,800. The area of the gathering ground is 4,000 acres. The ground stands at an elevation of 1,080 ft. above the sea at the embankment; and the water is declared to be of exceptional purity and softness. The reservoir, which has been named the Cantref, is three-quarters of a mile in length; its greatest depth is 32 ft.; and it has a capacity of 322,000,000 gallons. The embankment is 400 ft. long and 120 ft. high, while the width at the top is 30 ft. Passing through the embankment by means of a brick tunnel 600 ft. long and 18 ft. in diameter the water enters an aqueduct 32 miles in length. In order to reduce the pressure this aqueduct is divided by balancing reservoirs into four sections. The first is to Cefn, 5 miles; second, to Blackbrook, 9 miles; third, to Rhobin, 14 miles; while the fourth section, 2½ miles, terminates in two service reservoirs at Llanisben and Lisvane, which together have an area of eight acres. In its course down the valley the aqueduct passes through eleven towers or places. The gathering ground of the two reservoirs yet to be constructed is 6,400 acres, and when the whole scheme is completed Cardiff will possess a supply equal to 1,220 million gallons, sufficient for the requirements of the town, even at its present phenomenal rate of growth, for the next thirty-five years. Mr. J. A. B. Williams, C.E., was the engineer-in-chief of the works.

FOREIGN AND COLONIAL.

FRANCE.—The Académie des Beaux-Arts has definitely accepted the legacy which the late M. Bailly left. He was the architect who presided for a long time over the Society of French Artists.—An employé of Messrs. Hachette has just presented to the Carnavalet Library a curious collection of about 100,000 articles and scraps cut out of the newspapers by himself during the last sixty years.—The restoration of the portal of the Church of St. Nicholas des Champs is now being carried out. It is one of the most interesting historical monuments of Paris.—A new lighthouse, with a red light, is to be started on October 1, at the mouth of the Seine, on the dyke near Quillebeuf, below the mouth of the Lillebonne river.—The municipality of Saint Malo, who decided last year to erect a statue to the Corsair Sourouf, the execution of which was put into the hands of M. Etienne Leroux, now wish instead to have a statue of the navigator Jacques Cartier.—A competition has just been opened by the town of Lorient for a large building which is to comprise an elementary school, a professional school, and a sale des fûtes. The cost will be about 400,000 francs.—A subscription has just been started at Quimper for the erection of a monument to the memory of Mgr. Lamarche, which is to be placed in the cathedral. Mgr. Lamarche, who has lately died, was Bishop of Quimper and Léon.—Last week a monument to Dr. Gosset was inaugurated at Pécamp.—M. le Baron Alphonse de Rothschild has just presented the museums of Grenoble, Chambéry, and Cahors with several pictures, statues, and marbles.—The General Council of the Rhone has confided to M. Louis Roginat, architect, the direction of the works of the new Hôtel de la Préfecture. The young architect, who is a son-in-law of M. Louvier, is a clever artist, with a good deal of taste.—In making some excavations at Toulouse, on the Place des Carmes, two statues have been discovered, one representing a saint and the other a martyr; they have been taken to the museum.—A curious tomb has been discovered at Saintes, dating about the thirteenth century, and containing some jewellery and other objects.—The death is announced at Aix-les-Bains of M. Lavau Revel, landscape painter. He was a pupil of Guillemet and Bouguereau, and

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in.

Those marked with an Asterisk (*) are advertised in this Number.

Contracts, pp. iv., vi., & viii. Public Appointments, p. xxi.

was only thirty-seven years old.—Eugène Gonon, the founder, has just died in Paris at the age of eighty. He represented one of the most interesting and honourable types of the Industry of Art. He produced some very large works in his day. One very well known was the bas-relief of Dalou, "Mithras aux États Généraux," which now decorates the Chamber of Deputies, and to which he devoted the last seven years of his life. He was in his way a true artist, and an indefatigable worker.—The Académie des Inscriptions et Belles Lettres has just allotted to M. Comin, member of the French school of Rome, the funds necessary to continue his excavations in Chentou, in Tunisia, where he has already brought to light almost the whole of a theatre and part of a forum.—It is a happy idea of the Municipal Council of Paris to give the names of celebrated architects to some of the streets. A new street in the Marée of the Tenth Arrondissement is to be called Rue Hittorf, and two others, Rue Boffrand, and Rue Pierre Bullet. This last architect built the gates of St. Denis and St. Martin.—Last Tuesday the statue of Général Kellermann was inaugurated at Valmy.—A large Salle des Fêtes has just been commenced in the Place des Halles at Brest. It is to be very highly ornamented, and will be inaugurated next year by the President.—A very curious subterranean gallery has been lately discovered at Havery (Seine-et-Oise); it is about 500 or 600 metres long, and is hewn out of the solid gypsum; it is situated about 60 metres under the forest of Montmorency.

DARMSTADT.—The competition for the design of a new museum has been decided. One of the first premiums fell to Herr Neikelmann, a Dane, resident in Stuttgart, the other was awarded to Messrs. Schmieden & Speer, of Berlin. There were five scientific and fourteen uninvited candidates. Among the latter were Professor Hubert Stier (Hanover), and Bruno Schmitz, of Berlin. The first prizemen had been invited, together with Professor Thiersch (Munich), Herr O. Sommer (Frankfurt), and Herr W. Manchet (Mannheim). The cost of Herr Neikelmann's design is estimated at 75,000.

MISCELLANEOUS.

ARCHITECTURAL ASSOCIATION CONVERSAZIONE.—The annual conversations of the Association will take place on Friday, October 7, at the Imperial Institute. The subway from Kensington Station, by permission of the District Railway Company, will be open for the use of visitors.

AMALGAMATION OF FIRMS.—We are informed that the firm of John Freeman & Sons, and the West of England Granite Company have amalgamated, and will in future be known as John Freeman, Sons, & Company, Limited. It is not the intention of the company to offer the shares to the public. The offices of the late firm of John Freeman & Sons, at Penryn, Cornwall, will be the head office of the new company, and the management will be in the hands of Messrs. Freeman and their staff.

THE ENGLISH IRON TRADE.—With the exception of the steel-mill branch, there has been no notable addition to the orders received in any of the various departments of the English iron and steel trades. Both pig and manufactured iron exhibit little vitality, and lower prices rule for the latter. In steel generally little is doing, but in the north-west the Barrow Hematite Steel Company has received orders for nearly 25,000 tons of rails during the past week. Shipbuilders and engineers are quiet. The coal trade lacks animation.

THE SLATE TRADE.—The slate trade continues to improve as the season advances, and is likely to

continue very brisk in Carnarvonshire, though there may be a slight lull in Merionethshire when German shipments cease for the year. Our forecast in January has been fully borne out, the present demand not having been equalled for the last fifteen years, and it would be well for consumers to give as long notice as possible of their requirements, as the custom of buying from hand to mouth is likely to lead to disappointments and delay in the present state of trade.

COOKING APPARATUS.—Messrs. Comyn Ching & Co. have just completed an extensive set of cooking apparatus for the staff at the new Parcel Post Depot, Mount Pleasant. The kitchens of the various departments are fitted up with their latest improvements in steam and other cooking appliances, including several of their newly-invented apparatus for producing large quantities of fresh boiled water, by steam, for tea-making, &c.

OLD HOUSES IN BERMONDEY STREET.—The block of seven wooden houses standing on the eastern side of the street, numbered 88, 91, 93, 6, and reputedly 350 years old, is condemned, and will shortly be pulled down. They are four stories high, and have eight gables. Of late years the upper two floors have served for a woolstapler's business. The visitor should not fail to go into the two court-yards, and view the houses from the back. In one of the yards are three smaller houses, apparently as old, which, we are told, will share the fate of the rest.

TYLOR'S PEDESTAL VALVE CLOSET.—In reference to our remarks on page 207 ante, Messrs. J. Tylor & Sons write:—We quite admit what you say about the dust which might form inside our patent "Column" closet, and which we have now brought out our "1892 pattern," which quite overcomes this objection, as the shield is now continued round the back, in front of the outlet of the basin. The joint between the basin and the trap is undoubtedly above the trap, although it is below our patent "Pedestal Valve" closet does not require a small supply cistern (by which we meant a waste-preventing cistern), is that it is flushed by our patent Regulator Valve which is fixed to it, and can be supplied from any pipe. This valve makes the closet quite noiseless in action,—a great advantage when it is fixed in private houses. It is also a waste-preventer."

MEMORIAL TO THE LATE ARCHBISHOP OF YORK.—The sum of 800*l.* has been raised for a memorial in Peterborough Cathedral to Dr. Magee, the late Archbishop of York, and the committee have accepted the design of Mr. Pearson, R.A., for the cenotaph. The sculptor commissioned to execute the memorial is Mr. James Forsyth, of Hampstead.

SOUTH SHIELDS MASTER BUILDERS.—The members of the South Shields Master Builders' Association held their twenty-seventh annual meeting on Hall, Mr. F. B. Dobson in the chair. The following officers were elected for the ensuing year:—Mr. S. Sherriff, chairman; Mr. T. S. Wluter, vice-chairman; Mr. D. Lawes, treasurer; Mr. Jas. S. Wilson, secretary. Committee: Messrs. P. Marshall, F. B. Dobson, Jas. Young, R. Harper, and W. J. Robertson. Auditors: Messrs. G. Pollard and W. Yellowby. The meeting terminated with a vote of thanks to the retiring officers.

PROPOSED CITY IMPROVEMENTS, EDINBURGH.—The Town Council of Edinburgh have under consideration a scheme of city improvements involving an approximate cost in the aggregate of 138,000*l.* The proposals include the construction of a new bridge in place of the present unsightly and contracted North Bridge, and the widening of the thoroughfare onward to

Hunter-square from a width of 60 ft. to 80 ft. This proposal was objected to on account of the expense involved, and on a division the motion was lost.

Another proposal of a similar nature, the widening of Earl Grey-street, by throwing back the east side to a uniform breadth with the Lothian-road, was also negatived on the score of cost. An alternative scheme for making a new street from Fountainbridge onwards towards Lochrin to relieve the traffic at Earl Grey-street, was favourably entertained. This new thoroughfare would pass through certain slum property, and it was suggested that sites acquired should be utilised for the erection of dwellings for the working classes. A proposal for the acquisition of the block of buildings between MacLivan Hall and Bristol-street received general approval. The removal of this block of buildings will not only widen a narrow and much-used thoroughfare, but will open out to view the fine group of buildings comprising the new hall, medical class-rooms, students' union, musical class-rooms, &c. A suggestion was made that the principle of "betterment" should be applied to the buildings forming the east side of the street, which will be greatly improved in value by the clearance to be made. It was agreed to take power to widen the thoroughfare at Salisbury-place by acquiring the property at the south side of it, but as it was hinted that the proprietors might be exacting in their demands, an alternative scheme was brought forward for making a relief street by opening up Newington-place, which is at present a *cul-de-sac*, and continuing a street to Causewayside, onwards to the eastern extremity of Grange-road. The widening of a small portion of the street at the south back of Canongate recently approved, as also did several other minor schemes. The Town Council seem to have been greatly swayed by economical considerations, but the experience gained by the last improvement scheme leads to the conclusion that true economy is not the result arrived at by being chary in acquiring property that is not absolutely necessary, and unless which might then have been properly acquired has been enormously increased in value, and unless the principle of "betterment" is brought into play, such will be the case if the present scheme is carried out in the tentative manner proposed. When applying to Parliament for powers to carry out the improvement scheme, the question of acquiring power for the amalgamation of Leith and Portobello with the municipality of Edinburgh has been mooted. Considerable friction is apt to arise between the separate Town Councils as to tramways, water and gas supply, &c., which would be obviated by the amalgamation of the three bodies. If this were done, then would arise the question of new municipal buildings, a contingency which must be faced sooner or later.

THE METAL PRODUCTION OF RUSSIA.—According to official statistics for 1889, just issued, the production of metals in Russia was as follows:—Gold, 1,105,880 oz. alluvial, and 90,560 oz. metallic; platinum, 84,050 oz.; silver, 445,124 oz. in ingots; lead, 570 tons; copper, 4,725 tons in regulus; zinc, 324 tons, 44, 12 tons; iron, 728,714 tons of pig-iron, of which 70 per cent. were smelted with charcoal; Steel, 254,770 tons. The total number of workmen employed in the Russian mining and metallurgical industries was 416,836, out of whom 43,275 were employed in the coal industry, whilst the steam force used in the same covered 120,000 horse-power.

NEW PONTON DOCK AT NORTH SHIELDS.—On the 19th inst. the opening took place of the new pontoon dock constructed for and by Messrs. Smith's Dock Company, North Shields. The screw-steamer *Danless*, of Newcastle, was fully placed

upon the structure, the dimensions of which are 335 ft. in length, 67 ft. in breadth, 8 1/2 ft. depth of pontoon, & 3 1/2 ft. depth of stow. The lifting capacity of the dock is 3,000 tons. It is divided into twenty-four water-tight compartments. The pontoon can be given a list either outwardly or inwardly of 6 in. The valves are worked entirely by hydraulics. The pontoon is fitted with four 22-in. centrifugal pumps. The engines were built by Belliss & Co., engineers, Westminster, and the compound direct acting of 150 nominal horse power, with cast-iron standards at back and forged steel columns at front. The boilers were by Eltringham & Co., South Shields, and are 100 lbs. pressure. Mr. Dykes, consulting engineer, superintended the construction of the engines.

THE ALHAMBRA ALTERATIONS AND DECORATIONS.—The partial reconstruction of the Alhambra Theatre, London, was entered upon eight weeks ago, the designs having been before the Board of Directors for more than a year. The grand circle balcony has been advanced 6 ft. into the house, giving more seating and passage room. The private boxes, formerly twelve, have been reduced to ten, but two of the number have been enlarged. The alterations involved rebuilding and redecorating. The decorative tone is kept cream, white, and gold, with a little grey blue to relieve it. The frieze above the mirror panelling is a heavy raised material decorated specially for the work, the mirror panelling has been carried round the two ends of the circle to complete the whole. The ceiling has been levelled with fibrous plaster to hide the alterations, and is decorated, and painted a light blue with gold stars. The fronts of the balconies and proscenium have been redecorated, and the private boxes draped with amber brocade. The iron columns are covered with a raised gilded material, and the panels of the doors of the private boxes are filled with a similar material. The foyer has also been redecorated in the same manner. The five window spaces have been filled with Arabian screens and stained glass, having electric lights behind them. The upper circle balcony and bar, on the second tier, and the two staircases have been renovated, whilst the grand circle staircase and entrance-hall to private boxes and stalls have been redecorated. The theatre has been recarpeted and upholstered in colours and material to suit the general scheme. Electric lights made in hammered metal, and finished in silver and gold enamel, have been placed round the balcony fronts. The whole of the lighting work, including the new electrical plant at the rear of the theatre, has been carried out by Messrs. B. Verity & Sons; the decorations are by Messrs. Campbell, Smith, & Co.; the plastic ornamentation is by Messrs. Jackson; the iron stairs and brick construction by Messrs. Whitehead & Co.; the carpets by Messrs. Lapworth & Harrison; and the upholstery by Messrs. Shoobert. The works have been carried on under the supervision of the architects, Messrs. Clark & Pollard.

SLOPER'S PATENT FOLDING SEATS.—These seats, of which a specimen has been sent to our office, are contrived so that the legs and back fold up flat against the plank which forms the seat, so that a number can be packed and put away in a small space, or can be piled easily in a cart for carriage. The legs are designed with an upright piece which, when the legs are down, projects above the top of the seat and clips the supports of the back so as to hold them firmly. The legs, which when not in use fold inward towards the centre of the seat, are when in use kept stiff by a thick brace-piece hinged against the underside of the seat, which, when the legs are extended, is turned on its hinge and clips into metal clips on the legs, forming at once a tie and a strut, so that the legs cannot give in either direction. The whole seat is easily got into position, and perfectly firm when all the clips are in. Mr. Sloper sends drawings of folding-tables made on the same principle. We have not tested these, but the seat is a thoroughly satisfactory thing of its kind, and should be very useful.

GLASGOW ARCHITECTURAL ASSOCIATION.—A visit was paid on the 17th inst. by a party of the members of the Glasgow Architectural Association to Mackintosh and Barlow's Castles, by kind permission of the occupiers. A meeting was also held in the rooms, 114, West Campbell-street, on Tuesday evening, the President in the chair. Mr. Wm. Fraser, A.R.I.B.A., read a paper on "Domes and their construction." After dealing with general points of construction, he noted the chief features of interest in the following domes, viz., the Pantheon, St. Sophia at Florence, and St. Paul's, London. Mr. Robertson opened the discussion which followed.

CAPITAL AND LABOUR.

THE PLASTERERS' STRIKE AT NELSON, LANCASTER.—The plasterers at Nelson and Colne, Lancashire, who have been out six weeks, have resumed work, the masters agreeing to advance their wages from 7 1/2d. to 8d. per hour.

JOINERS AND CARPENTERS' STRIKE, LANCASTER.—The joiners and carpenters strike at Lancaster, which has lasted nearly eleven weeks, has been settled, and the men are to receive a half-penny per hour advance.

MEETINGS.

SATURDAY, SEPTEMBER 24.

Liverpool Engineering Society.—Visit to the Liverpool Overhead Railway Works, and the Liverpool Hydraulic Power Company's Works.

SATURDAY, OCTOBER 1.

Architectural Association.—Visit to St. Alban's Abbey, St. Michael's Church and Gateway. Mr. James Seale, F.S.A., will act as guide. Train leaves at 2.30 p.m. from St. Pancras.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

13,262.—WATER-CLOSETS: H. B. Thornton.—This invention relates to improvements in disinfectants for water-closets and the like. It consists in a disinfecting preparation composed of chloride of lime, permanganate of potash, or other disinfectant, and paraffine wax or a suitable form of sulphate of calcium or any cement-forming substance or pumice stone, which can retain the disinfectant until a flush comes and carries away a portion without prejudicially affecting its qualities. The inventor forms balls, squares, or other suitable shapes of the chemical with a small addition of the paraffine wax or its equivalent, intimately blending the latter with the former by melting, dissolving, impregnation, or other means.

13,622.—BRICKS, &c.: J. Davies.—This invention relates to the manufacture of bricks, tiles, and other such like articles from slate, shales, or slate refuse, in which material thin combined is subsequently manufactured into bricks, tiles, &c., by any of the means or machinery capable of making the combined material into the required articles. Lime in some instances may be added.

16,836.—LAVATOIRES, &c.: E. J. Preston and F. G. S. Han. These improvements mainly refer to the supply of water to lavatories and water-closets and to the efflux therefrom, with a view to economy in the manufacture, the prevention of waste of water, and the avoiding of the escape of sewer-gas from the drain side. For the purpose of strongly and lavatory having the inventors provide a supply cistern of a size suitable for one charge, and with a siphon-pipe having its inlet near the bottom of the cistern, and the down or outlet pipe through the said bottom, which is arranged somewhat above the bend or discharge level of the siphon, the bore or passage through the ball-cock being by preference sensibly smaller than that of the siphon and down pipe, the latter being provided at the basin with a suitable tap or valve, by preference self-closing. The basin is provided with overflow and waste appliances, which run below and preferably are trapped towards the drain.

17,006.—SANDING BRICKS: J. V. Lane.—The object of this invention is the construction of an apparatus which will thoroughly coat with sand the clay for making bricks, and the like, on the top, bottom, and sides thereof, as it issues from the pug mill, and presses the said sand into the clay to prevent it dropping off when the bricks are handled before burning. One or more cones, or cylinders with cones at one end, are provided on either side of the stream of clay as it issues from the pug mill. These cones or cylinders are fitted with stopped spirals round the peripheries, or other suitable means of distributing the sand. At the bottom of the apparatus is a trough to catch the surplus sand from the cones which does not adhere to the clay, and in this trough is placed a revolving drum fitted with vanes to throw the sand up to the bottom of the stream of clay. The apparatus is provided with a hopper to contain the sand, from whence it runs on to the cones or coned ends of the cylinders, and is thrown by the centrifugal action of the spirals over the sides and top of the clay. The cones or cylinders and the drum are mounted in suitable bearings on a frame, and caused to rotate at a high speed. Horizontal and vertical rollers are also provided to press the sand into the clay. The distributing cones, or cylinders, and drum are caused in to prevent loss of sand.

17,010.—DOORS: H. Gardner.—This invention has for its object to exclude dust and draughts, and also to prevent slamming and rattling of doors when closed. For this purpose the necessary parts of a door frame against which the door usually presses when closed are provided with a box, or gutter-shaped plate, backed by a spring or springs to force the said plate outwardly when the door is open, but which spring or springs become compressed as the door is closing, the plate or plates being then in close contact therewith.

18,583.—WINDOW-SASHES: E. J. Gibbons.—This invention provides for raising or lowering a top sash of any size without using a centre line, a long arm, or a pull-down handle; raising the bottom sash without unfastening the top one; lowering the top sash without unfastening the bottom one, either sash being automatically secured by the act of closing only, the various parts of the raising, lowering, and fastening devices being beyond the reach of a burglar, and the two sashes being raised a short distance, so as to ventilate between the sashes, and automatically secured in that position from the inside. The details of the invention can only be understood by reference to the drawings.

18,591.—NAILS &c.: G. Groff.—The object of this invention is to produce a machine which will take wire, cut it into suitable lengths, form heads and points upon each nail, and produce nails adapted to be used either as nails or screws, and to produce nails more cheaply than has been done hitherto. We must refer our readers to the specification for further details as they could only be mastered by reference to the drawings.

NEW APPLICATIONS FOR LETTERS PATENT.

September 5.—15,871, A. Bowie and W. Kenison, Folding Steps, Ladders, &c.—15,882, J. Honeyman, Heating Greenhouses, Dwellings, and other Buildings.—15,920, N. Wilson, Webster, Stoves, Grates, and Ranges.—15,920, N. Wilson, Glass and Iron Greenhouses.—September 6.—15,934, J. Bliton, Decorating Petticoats, Porcelain, Tiles, Bricks, &c.—16,997, W. La Grand-Bundy, Workmen's Time Recorder.

September 7.—16,040, W. Orr, Construction of Concrete Roofs and Floors for Buildings.—16,004, G. Jennings and J. Morley, Supplying Water to Closets and other places.—10,067, J. O'Rourke, Calissons.—September 8.—16,083, W. & J. Cross, Door Locks and Latches.—10,091, G. Briggs, Building Blocks or Bricks.—10,110, F. Perry, Water-waste Preventers for Flushing Purposes.—16,121, M. Domez, Ventilating Wood.—September 9.—16,131, E. Harvey, Water-closets.—16,165, W. Demm, Plasterers' Laths for Ceilings, Walls, or similar structures.—16,171, P. Bramwell, Fastener for Window-sashes, &c.—16,173, J. Moore, Grates and Stoves.—16,130, T. Horsfall, Window-sash or Lick Fastening.—16,155, H. Rompler, Coupling Device Applicable as a Window-fastener, &c.—September 10.—16,211, W. Murray and J. Macintyre, Kits for Pottery, Bricks, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,628, F. Jones, Window Sash-fasteners.—14,053, E. Urlicks, White Colouring Matter or Paint.—14,134, J. James, Chimney-pot or Chimney-pot Attachment, also applicable as a ventilator.—15,114, J. Andrew, Reciprocating Saws.—15,214, J. McGraw, Chimney-top.—16,330, E. Belleville and E. O'Neill, Cows.—16,340, J. T. and J. V. Bickel, Bakers' Ovens.—15,348, W. Steel and C. Abraham, Sash-fasteners.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

15,632, M. Blihorn, Sliding Step-ladder.—18,954, F. Tyers and O. Barnsdale, Bolters for Kitchen Fireplaces or Ranges.—19,467, J. Bloomfield, Plaster.—7,895, T. Baylis, Paving Bricks, Paving Tiles, and Quarries.—12,529, J. Glover and W. Stevens, Slow-closing Valves for Water-closet Tanks.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 13.—By Blake, Haddock, & Carpenter: 354, London-rd., Thornton-heath, 1, 1,850*l.*; 350 and 352, London-rd., 1, r. 115*l.*, 1,750*l.*; A. I. cottage in Alma-pl., 330*l.*; A plot of 1 building land, 72*l.*; An enclosure of meadow land, 5*l.*; 37, 10*l.*; 2, 6,300*l.*; E.g.r. of 12*l.*; 12*l.*; Typast, Bethnal-green, reversion in 55 yrs, 250*l.*; By Bell, Norris, & Hadley: 37, 80, and 4, Lambeth Palace-rd., Lambeth, u.t. 58 yrs., g.r. 24*l.*, r. 138*l.*, 1,025*l.*; 27, Crozier-st., u.t. 36 yrs., g.r. 6*l.* 15*l.*, 855*l.*

SEPTEMBER 14.—By J. W. Coade: 56, York-st., Lambeth, u.t. 30 yrs., g.r. 7*l.* 10*l.*, r. 36*l.*, 270*l.*; 1 and 3, Eddystone-rd., Brockley, u.t. 55 yrs., g.r. 11*l.*, r. 54*l.* 12*l.*, 235*l.*; By Stide & Butler: 16, Regent-rd., Glimbury Pl., 4, 600*l.*; 121, St. James's-rd., Holloway, u.t. 42 yrs., g.r. 5*l.* 5*l.*, r. 31*l.*, 200*l.*; 38, Scylla-rd., Peckham, u.t. 74 yrs., g.r. 6*l.*, r. 32*l.*, 220*l.*; 43, Dilston-grove, Rotherhithe, u.t. 65 yrs., g.r. 5*l.*, r. 32*l.*, 135*l.*; 41 and 45, Dilston-grove, u.t. 53 yrs., g.r. 10*l.* 10*l.*, r. 53*l.* 6*l.*, 395*l.*

SEPTEMBER 15.—By W. Brady: E.g.r. of 5*l.*, Vancel-st., New-cross, reversion in 56 yrs, 124*l.*; E.g.r. of 12*l.*, Malby-st., Bermondsey, ditto in 40 yrs, 205*l.*; E.g.r. of 11*l.* 15*l.*, Railway-terrace, Ladywell, ditto in 71 yrs, 254*l.*; By Newson & Co.: 10 and 11, Collins-rd., Tottenham, u.t. 88 yrs., g.r. 12*l.* 20*l.*; 63, Cumberland-market, and 130, Little Albany-st., Camden-rd., u.t. 32 yrs., g.r. 9*l.* 6*l.*, 825*l.*; 1 and 2, St. Anne-st., Stamford Hill, r. 6*l.* 11*l.*, 720*l.*; 1 and 2, Sherbro-villas, 1, 500*l.*; 29, Bolsover-st., Marylebone, u.t. 32 yrs., g.r. 6*l.*, r. 75*l.*; 6702; 3 and 4, Carburton-st., u.t. 33 yrs., g.r. 14*l.*, r. 145*l.*; 1, 1,465*l.*; By Wilkinson, Son, & Wood: A plot of land, area 3,300 ft., 1, Queen-rd., Brighton, 2,200*l.*

(Contractions used in these lists.—E.g.r. for freehold ground rent; l.g.r. for leasehold ground rent; i.g.r. for improved ground rent; g.r. for ground rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.)

PRICES CURRENT OF MATERIALS.

Table with columns for Timber, Iron, and Metals, listing various materials and their prices in different currencies.

TENDERS.

(Communications for insertion under this heading should be addressed to "The Editor," and must reach us not later than 12 noon on Thursdays.)

BLACKPOOL.—Accepted for brickwork in connexion with the Blackpool Tower buildings. Messrs. Maxwell & Tuke, architects, Manchester.
Carnwell Bros., Blackpool..... £7,332 8 4

BROADSTAIRS.—For the erection of a detached house, Rectory-road, Broadstairs, Kent, for Mr. Frank King Cochran. Mr. William A. Barr, architect, 65, Chancery-lane, W.C.
Parsons & Son..... £1,700
Marlin..... £1,380
May..... £1,450
Brown & Son..... 1,130
1,280

CHADWELL HEATH (Essex).—For the erection of a dwelling-house on the Whitehouse Estate, Chadwell Heath, Essex, for Mr. Geo. Smith, Mr. Geo. Stooke, architect, Forest Gate, E.
Willatt & Son..... £272 0 0
Booth..... 369 0 0
Taylor..... 216 7 6
Blanch..... 327 0 0
Hovell..... 213 22 0
Scott..... 225 0 0
Algar..... 209 18 4
Goume..... 215 10 0
* Accepted.

HANLEY.—For the erection of a shop and house, Lichfield-street, Hanley, for Mr. J. Swinerton, Mr. Ellish James, architect, 10, Albion-street, Hanley. Quantities by the architect.
C. Cope..... £240 0 0
C. Cornes..... £370 0 0
T. Goodwin..... 314 0 0
A. Ward..... 213 22 0
Ogden & Banks..... 389 0 0
A. Hall, Hanley..... 310 0 0
F. K. Talley..... 382 10 0
* Accepted.

HATFIELD.—For constructing an additional service reservoir, at the Waterworks, Hatfield, for the Municipal Engineer, K.G. Mr. G. M. Lawford, engineer, 13, Victoria-street, Westminster.
John Howden & Co..... £388 0 0
E. Ward & Co., 15, Great George-street, S.W..... 330 0 0
* Accepted.

HORSELL (Surrey).—For the erection of detached house, Horsell, for Mr. Percy, Messrs. Pusey & Follett, architects, 21, Colindale-street, W.
J. Harris & Sons..... £907
Building Department..... £1,752
G. Thompson..... 775
Mortin Wall & Co..... 878
S. Clifton, Easton-White..... 729
J. P. Collison..... 639
Serrit Bros. & Co., Chiswick..... 557
Simmonds Bros..... 615
* Received too late.

LEIPS.—For the erection of two houses at Arley, for Mr. Joseph Procter, Mr. F. W. Rhodes, architect, Upper Wortley, Leeds.
Bridges—Jno. Wilby & Son..... £207 0 0
Johner—J. E. Oates..... 90 0 0
Pinner—W. Broadbent..... 19 0 0
Preston—A. Manning..... 19 0 0
Sitter—J. Atkinson..... 16 10 0

LEYTON.—For repairs and reinstatements to the Beaumont Arms, Beaumont-road, Leyton, for The New London Brewery Co., Mr. William J. Ingram, architect, 44, Theobalds-road, Bedford-row, W.C.
W. Rows..... £172 0 0
Mid-Kent Building White & Co..... 216 0 0
Company..... 216 0 0
J. Kuisht..... 114 17 0
Sayer..... 92 0 0

LONDON.—Revised tenders for the erection of three warehouses in Buck's-row, Whitechapel, E., for Messrs. S. Schneiders & Sons. Quantities by Messrs. Franklyn & Andrews.
Macy & Fox..... £16,180
J. Brown, Son, & Richmond..... £13,200
Hinx & Hill..... 16,500
G. Cook & Horton (Ld.)..... 12,000
Kilby & Gayford..... 13,670
J. Richardson..... 12,500
Gutter & Son..... 13,548
J. Bentley..... 12,500
Walker Bros..... 12,670
G. Harding, Baker-street, W. Downs..... 13,220
Whitcheapel, E..... 12,405
J. & B. Cocks..... 13,248
* Accepted.

LONDON.—For alterations to "Volunteer" public-house, Upper Baker-street, for Mr. W. D. Schwarz, Mr. T. Ingram, architect.
F. Corbett..... £401 0 0
H. C. Clifton..... £370
J. Minge & Co..... 305
J. E. Edgar..... 365
H. Leasing & Son (Incorporated)..... 273
J. Higgs..... 347

LONDON.—For the erection of two shops at Lever-street, St. Luke, for Mr. E. Jones, Mr. Alfred Allen, architect.
Pickering..... £1,080
Deering & Son..... £913
Archard..... 1,050
Thomson..... 850

LONDON.—For the erection of a house at Willenden, Mr. C. Graybill Baker, architect, 3, Bloomsbury-square, W.C. Quantities by Mr. C. J. Ford, 4, White-court, Fleet-street, E.C.
H. Fremont..... £2,294 17 3
J. & S. Dwyer..... £1,548 0 0
Hinder & Co..... 1,624 0 0
J. Allen & Sons..... 1,835 0 0
Tennant & Co..... 1,587 0 0
Cusley & Drake..... 1,795 15 0
* Accepted.

LONDON.—For alterations and additions to the Wellington relief office, Highbury-mews, N., for the Guardians of the Poor of the Parish of St. Mary, Islington. Mr. William Smith, architect, 65, Chancery-lane, W.C.
Bellew..... £609 8
Brass & Son..... £136 10
Whitehead & Co..... 100 0
Norris & Luke..... 121 0
Luffell..... 170 0
Lown & Son..... 117 0
Ward & Lambill..... 148 0
Kerlaw..... 116 0
Bartlett..... 140 0
C. Cox, Cooks-lane, W. 114 0
Harvey..... 128 0
Winte & Son..... 112 0
Marshall & Hank..... 137 7
Stevens Bros..... 107 0
Langham..... 137 0
* Accepted.

LONDON.—For six fittings at "The King's Head," Upper Kenning-lane, S.E., for Mr. Sedgely, Messrs. Teasdale & Fisher, architects, 30, Coleman-street, E.C.
W. Mann..... £1,150 0 0
J. Higgs..... £192 18 0
Buckley & Beach..... 127 5 6

NORTHFLEET (Kent).—For cemetery works, Northfleet, Mr. J. T. Walford, architect. Quantities supplied.
W. J. Botball..... £5,824 0 0
H. Carter..... £5,076 14 0
W. Richardson..... 5,617 13 6
Trappett & Bailey..... 5,061 14 7
Kirk & Rowland..... 5,820 0 0
C. J. Stiles..... 4,866 14 0
G. E. Wallace & Son..... 5,479 0 0
J. G. Naylor & Son..... 4,929 0 0
B. Avelar..... 5,262 0 0
W. A. Wallace..... 4,853 0 0
M. C. Panton..... 5,320 0 0
W. H. Rayfield..... 4,746 0 0
W. Tuffe..... 5,257 18 10
H. W. Maitland..... 4,569 3 7
* Accepted.

PLYMOUTH.—For the restoration of Kingston Church. First contract: Restoration of roof. Mr. Edmund Sedding, architect.
Backland terrace, Plymouth..... £80
Dobell..... £50
Dunne..... £700
Farr Bros..... £50
Lawrence, Devon Guildry..... £60
* Accepted.

PONTWAIN (Mon.).—Accepted for the erection of thirteen cottages at Pontwain and Maceycroft, Mon., for the Provident Association of London, Ltd. Mr. G. Rowse, architect, Abercromby-Town, Lawrence, Blackwood, Mon.
..... £5,925 10 0

ROUTFORD.—For alterations to premises at the corner of Lord-street and Nevill-street, for the trustees of the late Thomas Dale, Messrs. A. W. Barry & Son, architects, 17, Market-place, Reading.
J. M. & G. Pettis..... 2,328
Fairbridge & Hatch..... £2,240
Brown & Backhouse..... 2,528
Whit & Irving..... 2,229
J. Humbleton..... 2,425
Hulse & Green, Benson..... 2,660
E. Wall & Sons..... 2,340
Steel, Liverpool..... 2,660
G. Hutchins..... 2,229
* Accepted.

TONBRIDGE.—For alterations and additions to a house in Dry Hill Park, Tonbridge, Kent, for Mr. Hugh G. Whitty, Mr. J. W. Little, architect. Quantities by Messrs. Knapp & Young.
Strange & Son..... £4,121
Thos. Frigg, Junr..... 2,086
Jones..... 4,140
Punnett & Son..... 3,693
* Accepted.

WALTHAMSTOW.—For the erection of three cottages, Walthamstow, N., for Mr. Richard Scully, Mr. John Groom, architect.
G. S. Archer..... £1,360
Roni..... £698
Deering & Son..... 1,170
Reed..... 882
Fuller..... 1,075
L. J. Lovell..... 917
S. J. Scott..... 1,045
* Accepted.

WHITSON.—For the erection of board-room and offices at Whitson Workhouse, Freeton, for the President Board of Guardians, Mr. J. Gantt, architect, Moonie-buildings, St. Helens. Quantities by the architect.
Jas. Almond..... £2,790 0 0
Hughes & Stirling..... £2,493 0 0
W. Morgan..... £2,775 0 0
H. L. Davies, St. Helens..... 2,288 10 0
P. Pickles..... 2,274 0 0
* Accepted.

WOOD-GREEN (Middlesex).—For the erection of a detached villa residence, Bounds-green-road, Wood-green, Mr. Jov. Farr, architect, 20, Brompton-pavement. Quantities by architect.
Walkinson..... £1,521
Martin & Co..... £7,437
W. J. Houghton..... 1,500
Mastock Bros..... 1,453
Epps..... 1,450
F. Volter..... 1,463
H. Esq..... 1,594
* Accepted.

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The Builder.

Vol. LXIII. No. 2501.

OCTOBER 1, 1892.

ILLUSTRATIONS.

Cathedrals of England and Wales: XXIII., Winchester.—Drawn by Mr. A. Needham Wilson, A.R.B.A.	Double-Page Ink Photo.
View in the Nave, Winchester Cathedral.—Drawn by Mr. A. Needham Wilson, A.R.B.A.	Single-Page Ink Photo.
The North Transept, Winchester Cathedral.—Drawn by Mr. W. A. Peto, F.R.I.B.A.	Single-Page Ink Photo.
Plan of Winchester Cathedral.—Measured and Drawn by Mr. Roland W. Paul	Double-Page Photo-Litho.
Brass Altar Cross and Candlesticks for Carshalton Church.—Designed by Mr. Rinaldo Blomfield	Single-Page Ink Photo.
Stone Reredos, St. Albans Church, Teddington.—Mr. A. H. Skipworth, Architect	Single-Page Ink Photo.

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Mr. Flinders Petrie's Exhibition.



OR several years past, except last year, a special exhibition has been held in London of objects that have been hurried in the soil of Egypt for more than two, and not unfrequently, for more than three thousand years.

The exhibits of previous years have done important work in lifting the veil from the long-forgotten past, and revealing distinctly the state of the arts on the sites and at the periods noted. When it is considered that these exhibitions have all been inaugurated by one enthusiastic man, who has actually found the objects during the previous year, our interest, excited by the art value of the objects themselves, cannot but be greatly enhanced by the display of prudent investigation and hard work, the evidences of which are before us at every turn.

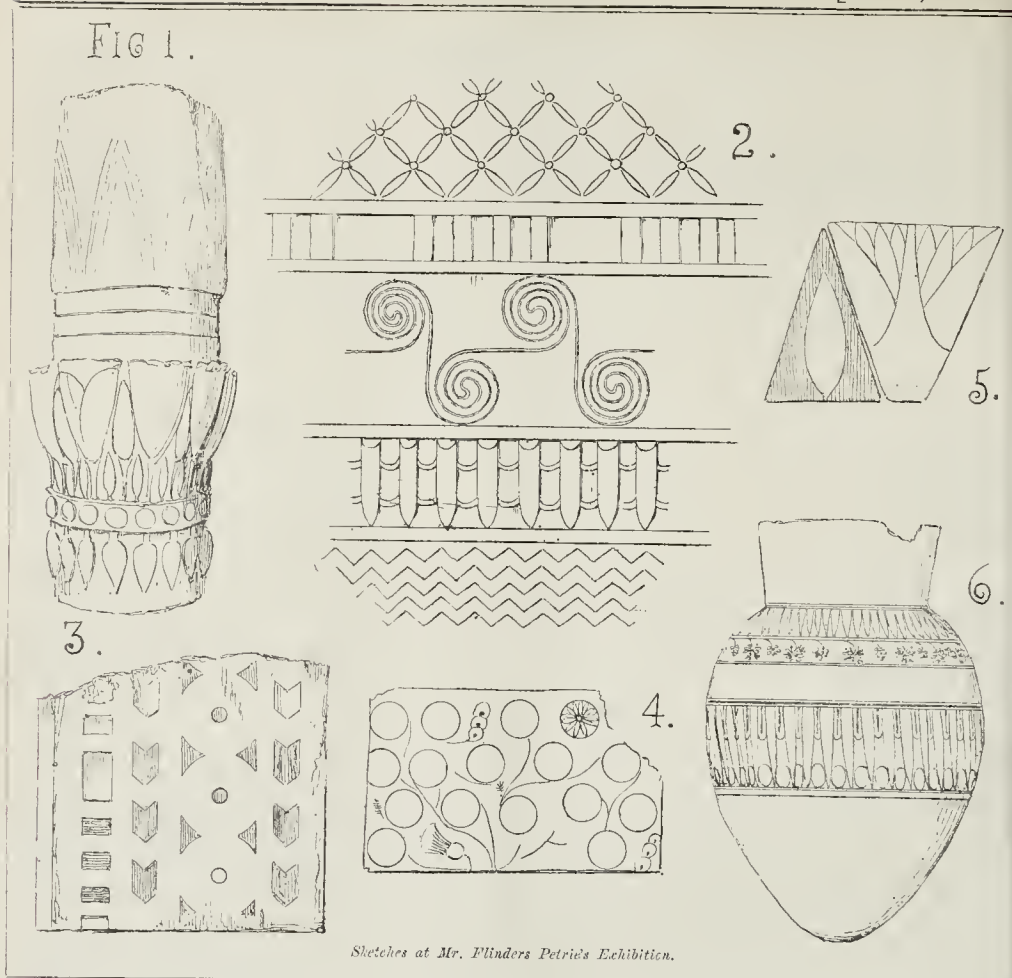
Mr. Flinders Petrie's success, which, for a year or two may have seemed to a casual observer as the result of fortunate chance, now appears as the result of careful study beforehand, for selection has evidently been made of each site excavated, with a view of obtaining from it some historical evidence, or some phase of art different from that which other sites might be likely to yield.

For many years Egyptologists have recognised a peculiar style of art different from what has been found on other ancient sites, in the objects recovered from the ruined mounds known by the modern name of Tel-el-Amarna, which are situated on the east side of the river Nile, about 180 miles to the south of Cairo, the remains being on a wide plain extending from the river to the Libyan mountains, where, at a long distance from the site of the city, a great many tombs excavated in the rock have been recognised and examined. The city has been destitute of modern buildings, and only covered here and there by the feeble remains of modern villages of small size, which have never been

sufficiently large to totally destroy the ancient works hurried beneath them. The site has long been known as that of a city founded by Amenhotep IV. about 1400 B.C., and where,—called heretic by some, and reformer by others,—he set up the worship of Aten, the solar disc, which was likely to have succeeded to Ammon as the National God, if this new capital and the cult that he therein founded had not had an ephemeral existence. But the short life of the King, and rapid changes in succeeding reigns, caused the new foundation to pass away more rapidly than it was formed, and the whole city appears to have been destroyed within a generation of his death. Thus transient was the reformation of its founder, but the change of religious system and a fresh impress on the art designs remain on the objects that have been recovered from the site. The charming little statuette of Amenhotep IV., in steatite, now in the Louvre, remarkable for its natural treatment, came from here. So did the representation of the adoration of the solar disc, figured by Prisse d'Avennes in his great history of Egyptian art. A ray of life and light proceeds from the disc to each figure in the composition, terminating in an open hand. Prisse figured also an equally remarkable painting from one of the tombs, which gives a geometrical elevation and plan combined of a palace, the architectural lines being intermingled with figures of the trees and shrubs which grew within the enclosures. It is portrayed without regard to the stiff conventionalism of an earlier period, agreeing in this respect with all the objects found on this site. A bas-relief of the queen serving Amenhotep deserves passing mention. It is remarkable as showing the whole of the figure, while the garment which doubtless actually covered it is represented wholly behind it. No systematic excavations have ever yet been made on the site, although many partial ones have been attempted, all of which appear to have produced good results. It was through some of these that Prisse was able to give the plan of certain of the buildings, showing the width of some of the streets, parallel and at right angles to the Nile, and to record the existence of a vast enclosure of rectangular form in which stood the great Temple of the Solar Disc.

These discoveries were sufficient, doubtless, to show to Mr. Petrie that the site was likely to produce important results if a systematic exploration were made, and to this work he devoted himself in the winter of the past year, and the spring of the present one. Attention was also drawn to the site by the discovery of the tomb of King Amenhotep far away in the mountains, eight miles from the site of this city. In this tomb, partially explored by the Egyptian Government, were found fragments of the Royal sarcophagus and numerous wall paintings (one of which represented the King and Queen lamenting the death of their daughter), but much broken, not only as the result of hasty workmanship, but of fanatical violence, for the tomb had evidently been opened and desecrated.

Mr. Flinders Petrie entered upon his work with the knowledge that the date of whatever might be found would be well assured, and the results show the accuracy of recorded history. The objects met with are all of the period of the founder, with hardly a single exception, and traces of the overthrow of the city were abundant. It appears from the records that the founding of the city began in the fifth year of the founder's reign, and that the works were carried out in twelve years. He died in the eighteenth year, and destruction appears to have fallen on the city after three short succeeding reigns. Its name has not been recorded, and, strange as it may appear, nothing has yet been found among the ruins to afford a clue to it. The excavations have revealed the site of the royal palace, and at right angles, and in close proximity to it, traces of the temple have again been met with. The town was adjacent to both buildings. Several ancient roads converge on to the site, and, at the distance of about three miles, several remarkable stelae are carved on the rocky cliffs, a cast of one of which is in the exhibition. It records the founding of the city 3,300 years ago. One of the most noteworthy of the discoveries is that of a painted floor, in what was the harem of the palace. It formed the floor of a large hall, 60 ft. long by 20 ft. wide, and the peculiar style of the art works of the city is well illustrated by it. The pattern is not symmetrical, and one side appears to have been the work of



Sketches at Mr. Flinders Petrie's Exhibition.

one artist, the opposite side by another, the whole being a mass of foliage, flowers, birds, and animals, some of the latter being of much freedom of drawing, showing no little knowledge and power of expression. The foliage is in the style of the painting from one of the tombs already referred to, and the whole composition is a remarkable departure from the previously existing art. This pavement has been roofed over since its discovery, and is now preserved from injury by a guard of soldiers.

The exhibition is held at No. 4, Oxford-mansions, and is contained in three rooms, where the objects found are arranged in glass cases, and displayed as well as the limited space will admit. On entering, the visitor familiar with Egyptian work is struck by the difference of type visible in many of the articles. There are a vast number similar in general style to what are found elsewhere, and a casual glance would tell that all were Egyptian. Yet the freedom of the designs is at once apparent, while certain differences of execution are apparent here and there. For instance, incised work, not unusual elsewhere, is abundant here. So is inlaid work. But the beautiful finish of some of the fragments of sculpture, coupled with admirable modelling, will command attention. Some of the figures have almost the purity of Greek works, remarkable when the remote antiquity of these objects is considered. The visitor must regret that, by the regulations of the Egyptian Government, only fragmentary works are allowed to be removed; and hence,

the first appearance of the exhibition is somewhat disappointing, and what it has to teach has to be sought for in portions of ancient works rather than in complete specimens.

Turning to the architectural remains as being of most interest to our readers, several objects may be noted. These are fragments of columns covered with reeded patterns, some being of large size, fully 5 ft. in diameter. Others are banded with rows of hieroglyphics carved in very bold and effective fashion. Another has the heads of two storks remaining in high relief above a reeded pattern, as if the birds had been carved in them entirely; quite a new departure in Egyptian work.

Some other columns have had bands of delicately-wrought figures in procession. Another fragment of a column has the solar disc with its rays extending to various objects and cartouches arranged in proximity, and this figure, the emblem of the new and special cult of the city, is found on more than one of the fragments. Another column has been formed entirely of green glazed terra-cotta, built up in small sections.

Some sandstone slabs have a rather rough pattern of inlay work of red, green, and white vitrified pottery, and there is a special show-case filled with highly-suggestive specimens of various other kinds of inlaid work of vitrified pottery, not only designed for insertion in stone, but in earthenware vases and such like. Some of these patterns are very effective, and are capable of being reproduced for modern work. One of the earthen-

ware tiles, intended probably for wall decoration, is inlaid with a pattern of embossed daisies and thistles, of natural colours, the branches and stems being painted on the surface of the tile. But this system of inlaying has been applied to some larger works, and there is just a fragment, and no more, of a piece of polished granite inlaid with white alabaster.

There are many fragments of architectural cornices and other portions of building, mostly with incised patterns and inscriptions sunk in square and coloured. Traces of colour are, in fact, apparent on almost all the works. Some of the objects are of granite, but the greatest number are of a fine-grained limestone, which is capable of being delicately carved.

We have already referred to the columns with bands of figures. From the same locality come the fragments of columns carved with a very delicately-worked pattern of involved scrolls of archaic type, zig-zags, and network. A small column is decorated with some pretty patterns of lotus leaves and buds.

The painted floor, still remaining *in situ*, is illustrated by a capital drawing made by Mr. Petrie, and by full-sized sketches of the decorations, in colours. Elsewhere is a large piece of wall-painting. When perfect, it represented the king and queen with servants attending, and the infant princesses seated on cushions. But only portions of the figures now remain, although there is a great amount of minute and elaborate detail. It is painted

on a ground of friable Nile mud, prepared only by a coating of white, on which the subjects have been drawn. How such a large mass of fragile material could have been detached from the wall and brought so far is a matter of some surprise.

The rooms are fitted with cases of delicately-wrought personal ornaments, objects of every day life of this early period, frit and colours used in various arts, glass and small sticks of glass for re-use, and pottery, some of which is curious, but of a type resembling what has been found elsewhere in Egypt. There is, however, a remarkable exception. Vast quantities of fragments have been found of early-looking make, resembling the archaic pottery found by Dr. Schliemann at Mycenae. They come from the waste heaps of the Royal Palace, and, from their connexion with dated works, there can be no possible doubt but that they are of the same date as the city. Other examples have well defined forms agreeing with Phœnician work both in colour and form. Among the remaining noteworthy objects are the fragments of Cuneiform tablets, showing that correspondence was kept up with Asia; various moulds for formation of patterns for inlay; a whole collection of objects in cast plaster for use in the decoration of buildings; a case of worked and serrated flints, showing that such objects were in use in the 18th dynasty; sculptor's tools, stone weights, and a vast number of other articles.

Many of the inscriptions give the names of the king and queen, the king being designated by his later name of Khuenaten, proving that he and the queen did not change their names and adopt the adoration of Aten until after their marriage.

The foregoing will show that this exhibition is one of unusual interest, and especially so since the objects are unique. Mr. Petrie may be congratulated upon the success of his labours, and it is to be hoped that his ill health, brought about by his devotion to his work, may be speedily improved.

The exhibition is announced to remain on view until October 15.

The sketches represent: Fig. 1, part of the shaft of the lotus column already mentioned. It is 1 ft. 10 in. high by 9 in. diameter in the broadest part. Fig. 2 is part of the pattern on one of the limestone columns from the palace. The pattern is very minute and delicate, and there are several variations. The network around the upper part of the shaft is compared by Mr. Petrie to that of the columns of the Temple of Jerusalem. The columns banded with processions of minute figures came from the same place. Fig. 3 is one of the most perfect of the fragments of constructional inlaid work, although not the most elegant. It is in sandstone, which has been sunk in for about half an inch and filled in with the inlay, which is of red and blue vitrified terra-cotta. Fig. 4 is one of the wall tiles referred to, 4 in. by 6 in. The daisies have fallen out, but one is sketched from a loose example. The colours are natural. Fig. 5 is a neatly-worked pattern for inlay, also of vitrified terra-cotta. The lotus flower is of yellow green, terminating in chrome yellow, the upper part being blue, white, and grey. The alternating pattern consists of a white lotus bud on a dark reddish-brown ground, all the colours being very fresh and effective. The height is about 3 in.

Fig. 6 is an almost perfect vase 13 in. high, of bright red pottery, having a pattern of cornflowers and seeds outlined in black and filled in with blue, as are also the other patterns, the dark portions being black. These examples, sketched from the most perfect of the objects, but not at all from the most beautiful, give a new insight into the state of the arts and the production of artistic work in the remote past of three thousand three hundred years ago.

MESSRS. CLARK, BUNNETT, & CO. (LIMITED),
engineers and founders, of London, New York, and
Paris, ask us to mention that there is no truth in the
rumour current of their intention to discontinue
business.

“EXCAVATIONS BY THE AMERICAN SCHOOL AT THE HERAION, NEAR ARGOS.”

It has been for some time known that the excavations carried on at the Heraion up to the end of last April by Dr. Waldstein had been attended by very marked success, and were of special interest as likely to throw light not only on the architecture of the date of Polycleitus, but also on that period of the history of Greek sculpture which extends from the Homeric Age to the sixth century B.C., a period for which evidence has been hitherto scanty and fragmentary. The early publication of some of the most interesting results is expected in a number of the Annual Report of the American Institute, which is to be issued shortly. Meantime there appears a provisional report in the last issue of the American Journal of Archaeology, a brief summary of which may be interesting to our readers.

Dr. Waldstein's excavations, it may be remembered, are not the first that have been made on a site always known to be promising. As early as 1854, Messrs. Rhangaubé and Bursian made tentative, but quite fruitless excavations in the place where it is now known the second temple lay. Unhappily, or perhaps happily, as the work has now fallen into most competent hands, they trenched no deeper than the tops of the extant walls, and all traces even of their work have now disappeared. Pausanias, in his account of Argos (II. 17) devotes a whole chapter to an account of the two temples of Hera at Argos,—temples which were the main centre of the worship of the goddess from pre-historic times. He tells how the earlier temple, situated on the higher part of the hill, was burnt by the carelessness of a priestess, Chryseis, who fell asleep, and her lamp set fire to the building. This was in 423 B.C. The second temple was put in hand almost immediately afterwards, but a site was chosen a little further down the hill. The architect was Eupolemos, an Argive. The temple, begun in 420 B.C., was completed in 416. The great temple-statue was from the hand of Polycleitus, and the general supervision of the sculptured decorations fell to him.

We begin with the earliest temple. It has only been provisionally excavated. It was found to be built on a platform, which was supported by polygonal walls. Trenches were dug, and the ancient polygonal pavement was found; also thick layers of burnt wood, which confirm the account of the destruction of the temple. With this ancient temple may be taken another,—and, to our minds, the principal,—discovery made, the site of which is near the second temple. At its west end the ground was dug away to the depth of about 30 ft., and below this the excavators came upon a thick stratum of black earth, which contained a vast number of objects belonging to a primitive period of Argive art. Dr. Waldstein himself thinks, and he is right, that these scarcely rank inferior in interest to the Tiryns and Mycenae discoveries. They are certainly their fitting and necessary sequel. None are later, he holds, than the sixth century. They consist of terra-cotta figurines, vases, marble heads, bronzes statuettes, miscellaneous objects in bronze, gold, silver, ivory, amber. Surely, among these there will be some that will throw light not only on early Argive art, but also on the early cultus of Hera,—the cultus, possibly, before she became the accredited wife of Zeus, when she was the cow-goddess Io.

For architectural interest the second temple, in which the excavators speedily concentrated their efforts, may rank first. This has been almost entirely cleared. The foundation walls were laid bare to a depth of 5 inches, and this resulted in the discovery of so many architectural fragments that the temple, it is thought, can be accurately restored (on paper). It is interesting to find that the architectural fragments bear a certain resemblance to those of the remarkable tholos

at Epidaurus, which is now usually credited to the younger Polycleitus. It is the resemblance moreover of earlier to later work. The closest analogy is reported to be the Erechtheion at Athens, but the exact points of resemblance are not yet stated. Of the many fragments of sculpture most seem to have belonged to the pediments. Conspicuous among these fragments is a life-size marble head, probably of Hera, and in perfect preservation,—a head which is naturally of the first importance for the study of the style of Polycleitus. In the interior foundation was found a large piece of a metope with the torso of a warrior fighting. The sculptured decoration of the temple, Pausanias tells us, related to the birth of Zeus and the battle of the gods with the giants, and the taking of Troy.

Finally, below the two temples the excavators found a terrace upon which were remains of several buildings not mentioned by Pausanias,—i.e., a large stoa, extensive aqueducts, and a third temple. These, with the complete unearthing of the first temple, are reserved for the next season, shortly to begin.

NOTES.

THE Labour Parliament has been followed by the Commercial Parliament, the Associated Chambers of Commerce having been in conference at Newport (Mon.) last week. The subjects discussed have nearly all been on the agenda before,—rating of machinery, technical and commercial education, railway and postal facilities, the decimal system, and so on. With regard to the last-named subject, a Board of Trade official who was present remarked that he had no mandate from his Board, and that the initiative must come from the people, but that he himself was decidedly in favour of the early introduction of the system. It goes without saying that the conference was of the same opinion, and passed a resolution to that effect. Thus there has now within a month been a mandate from both capital and labour,—the voice of this conference and of the Trades Unions Congress being unanimous,—and it may be asked what more is required to set the wheels in motion? Who are the “people” from whom it is essential that the demand for the desired reform should emanate? Of course the Parliamentary official would answer,—“the electorate”; and thus the Trades Unions on the one hand, and the Chambers of Commerce on the other, must set about influencing the electors in their respective spheres. The debate on this question at Newport was on precisely the same lines as that of two years ago,—to which we alluded a fortnight since,—Mr. Spicer, M.P., suggesting that the most important point to be first secured is the encouraging of the children in the elementary schools to take an interest in and understand the subject. The law relating to Building Societies was also discussed, Imperial penny postage strongly advocated, and the proposal for universal free trade between the colonies and the mother country considered. The debate on the latter question resulted in the adoption of the following resolution—“That a commercial union between the Colonies and the Mother Country would tend to promote the permanence and prosperity of the Empire. This association would, therefore, urge her Majesty's Government to take every possible opportunity of furthering this object.” The original resolution was of rather wider scope, but the curtailed form as just given appeared to commend itself to the majority of the members.

WE quite concur in the opinion of the London County Council, as reported in another column, that it is time that Vauxhall Bridge were rebuilt, but it is with great regret that we notice the inclination to recommend a steel bridge with granite piers instead of a solid and monumental granite

structure. In regard to the mere pecuniary aspect of the matter, there can be no doubt that the granite bridge would be the more economical in the long run. The economy would not be felt in the present generation, certainly, but is it not something to hand down to other generations a solid monumental structure which will last for centuries, rather than a metal bridge which will necessitate a running expenditure for painting and repairs, and which will probably have to be pulled down and rebuilt at a time when the granite bridge would be as good as new? But in an architectural sense the granite bridge is amply worth the extra cost, for the dignity which such a work confers on the river and the city, and the permanent satisfaction which it gives. Look at London and Waterloo Bridges, those great works which have been the admiration of the world since they were erected, and see what poor things the hybrid bridges of Blackfriars and Westminster appear in comparison with them. The Metropolitan Board of Works, amidst all the melancholy history of its declining days, earned our gratitude, even in those latter days, for the fine and enduring monument they left us in the shape of the beautiful bridge at Putney; a work which has been appreciated, too, as it deserved: over and over again we have heard the expression, not merely from architects but from people of all sorts of professions, of satisfaction that the Board had had the spirit to build a monumental bridge at Putney. Let the County Council at least emulate the Board of Works as far as that: let them promise us a monumental bridge worthy of a great capital and a world-renowned river, and they will not find themselves without substantial public support and appreciation.

AS there appears to be some attempt to get up a protest against what is intended or supposed to be intended to be done in preparing the Chapel Royal at Whitehall to form part of a United Service Institution, it may be as well to state the facts. Nothing is to be done at the chapel or banqueting-hall (by whichever name we call it) except to break through a couple of doors on two levels in the south side of the building, in what is merely a brick wall. Messrs. Aston Webb and Ingress Bell are preparing plans for the additional buildings, which we have seen, and which are carefully designed so as to avoid as much as possible any appearance of interfering with the architectural design of the existing building. A block of buildings containing committee and other rooms, a lecture theatre, and library, has been designed to stand south of the banqueting-hall, and has been purposely kept as an entirely distinct design in treatment and in the levels of its cornices, stringcourses, &c., while it is further cut off from the existing building by a plain piece of wall of a few feet in width, set considerably back from the line of the banqueting-hall, and entirely without what are sometimes called "architectural features," so as to leave the return of the old cornice, &c., undisturbed, and separate the new building entirely, architecturally, from the old one. There can be no pretext, on the face of the plans as prepared, of anything being done to interfere with or spoil the banqueting-hall. In regard to this latter we may mention, what we believe few people are aware of, that the banqueting-hall architecture is not as built and left by Inigo Jones; it was rebuilt in the earlier part of this century by Soane, to a great extent at all events, and it seems uncertain whether Soane took down and replaced the actual stones, or whether he only rebuilt the design, wholly or in part. The masonry must at all events have been a good deal re-worked on the face, if the actual stones were reset; so that it can hardly in any case be of the same interest as if it were an intact building by Inigo Jones.

A PROCESS of sewage purification on a small scale has been started by Mr. W. D. Scott Moncrieff, C.E., at his house at

Ashted, which has the recommendation of novelty, both as to the principle on which it is based and the method of carrying it out. Availing himself of the generally-accepted theory by scientific men of the existence of putrefactive bacteria in all dead animal and vegetable matter undergoing decomposition, Mr. Scott Moncrieff has devised a filter in which he believes this process is encouraged, and the destruction of the organic impurities in the sewage is hastened and completely effected. His filter-bed is a long trough 15 ft. long, 3 ft. deep, and 2 ft. 6 in. wide. The sewage is passed into the bottom, and has to find its way upwards through successive layers of flint, coke, and gravel, which materials, he believes, form a nidus for the putrefactive micro-organisms. Mr. Scott Moncrieff claims success for his process, but sanitarians will require some more searching tests than the use of the naked eye and the nose. The practical details of the scheme will no doubt be closely scrutinised, and receive modification where necessary, and the chief point for our consideration is the soundness of theory on which the process is based. The existence of putrefactive bacteria has been long admitted, and the surgical process called "Listerism," which has led to such remarkable improvement in surgical practice in recent years, is based on the principle of excluding these bacteria from open wounds. But there is a good deal of difference between preventing their action and turning it to good account. Mr. Scott Moncrieff is under the impression that these micro-organisms entirely destroy and remove the solid matter of the sewage, and that his filter does not get choked; but apart from the fact that sewage contains a large quantity of inorganic matter which constitutes the sludge of town sewage, and to a less extent of the sewage of private houses, the organic matter is not destroyed by bacteria but changed into other substances, some of which are exceedingly potent animal poisons. It is, indeed, we believe generally accepted in the medical profession that it is these poisons (known as "ptomaines," "enzymes," &c.) which cause diseases, and not the bacteria and ferments which give rise to them. These substances, together with numerous new chemical elements, pass off in the effluent water, and if sufficiently concentrated might produce serious disease in any one drinking it. The great evil of our underground drains and cesspools is the formation and concentration of the products of putrefaction produced in this way by bacteria and putrefactive ferments; and, although we feel great interest in Mr. Scott Moncrieff's experiments, we are equally bound to call attention to the weak places in his theory. There is one encouraging feature which we must note in favour of this process, namely, that the germs of typhoid and of cholera,—the principal water-carried diseases,—are destroyed by the products of the putrefaction of sewage, and they would be less likely to escape a filter such as the one described than when spread on a sewage-farm, or allowed to escape without chemical destruction into streams and wells. Mr. Scott Moncrieff expects very important results from his system, and is establishing a laboratory at his house for further systematic experiment and investigation; so that we shall hope to hear more of it.

THE interesting letter from Hamburg, published in the *Times* of Tuesday, fully accounts for the cholera there, in its account of the water supply which is pumped from the Elbe, and drunk unfiltered, after a short deposition in settling-tanks. It seems astounding to read of such a thing in a large European city in these days; and now that such a terrible Nemesis has come on the Hamburgers probably something will be done to hurry on the completion of new waterworks and supply the city with wholesome water. But they had much better give up taking it out of the Elbe altogether, if they have (as we believe) sufficient sources of supply of another kind.

THE report of Mr. Alexander, the Sanitary Inspector for St. Leonard's Shore-ditch (incorporated with the report of the Medical Officer of Health, Dr. Allan), contains some notes and statements in regard to school sanitary appliances which deserve attention. The special point which arises out of it is as to the use of trough water-closets for schools, and the Sanitary Inspector's observations in regard to those at the Shap-street Board School. The Inspector reports that,—

"On inspection of the sanitary arrangements of these schools, they were found to be very insufficient, and to be of the most defective character. Thus for about 400 infants there were only four closets; for about 300 boys, four closets; and for about 300 girls, four closets also."

Each of these three ranges of closets were fitted with iron troughs, which were said to be flushed twice daily. As a matter of fact, it was found on each of several inspections that the walls of the troughs were encrusted with fecal and urine deposits, the beds of the troughs largely filled with excrementitious matters, and the atmospheres of the closets loaded with stench of the foulest description.

The w.c.'s of the male and female teachers being defectively drained were periodically stopped, and, in removing the recurring blockages, the seats had been broken, and were dangerous to sit upon.

The caretaker was under instructions to be very economical in the use of water, and, as a result of that instruction, it was found on each inspection that water was not only shut off from the closet-troughs, but also from the lavatories, and the drinking-fountains in the play-grounds.

These conditions being reported to the Vestry, a resolution was carried directing notice to be served, requiring the School Board to abolish the foul troughs, and to provide improved and augmented w.e. accommodation, and to provide a continuous supply of water to drinking-fountains, lavatory basins, and closets."

The School Board submitted plans for the erection of new water-closets in sufficient number, but contemplated the re-introduction of troughs, and a notice was served requiring each closet to be fitted with a separate trapped soil-pan. The Board appealed to the County Council, with the result that the trough-closet was allowed on condition of a flush at every half-hour during the day. The Inspector calculates that this means an expenditure of 3,350 gallons per day in flushing, on the estimate of the architect that ten gallons per seat is required for each flush. At the hearing of the appeal it was urged, on behalf of the Board's view, that the pan system was not suitable to a school of this class; meaning we presume that the closets were misused and damaged by children of the lower orders; and this consideration seems hardly to have had weight enough with the Inspector. On the other hand, the evidence brought forward as to the frequently objectionable condition of trough closets, and the amount of water required to keep them in a tolerable state, is rather serious, and throws very considerable doubt on the advisability of continuing that system.

THE Borough-road Polytechnic, the opening of which by Lord Rosebery was fixed for this week, has been established in the school-house of the British and Foreign Schools Society, founded by John Lancaster, the Quaker, in 1808, and which was built in 1840-3. The site belongs to the Bridge House Estates, and the schools were demised to the trustees for a term of twenty-six years from Midsummer, 1875, at a rent of 120l. per annum. In November, 1888, the Estates' Committee of the Corporation agreed we gather, to grant, upon the surrender of the existing lease, a new lease to the Charity Commissioners, or the Institute's governing body, for a term of eighty years, at 120l. for the first thirteen, and 300l. for the remaining years, subject to a reversion to the Corporation if the premises should cease to be used as a Polytechnic. They have, moreover, offered to sell the freehold for 10,500l. The Charity Commissioners undertook, conditionally, to give a yearly grant of 2,500l. out of the Parochial Charities' common fund, and have lately increased their donation by an additional grant of 4,000l.—as we read in

the *Times* of August 1 last. Mr. Rowland Plumbs superintended the alterations made in the premises to adapt them to their new purpose.

THE report* of Dr. Theodore Thomson to the Local Government Board on an outbreak of enteric fever in the urban sanitary districts of Rotherham, Rawmarsh, and Greasborough, in the West-Riding of Yorkshire, is a long and unusually interesting one, embodying the results of a very careful and painstaking investigation. The report goes to show that there was no special reason to connect the illness with defects of drainage (although this was not all that might be), but that the nature of the ground from which the water supply is drawn was at fault. It was noted by Dr. Thomson that Rotherham and Rawmarsh, though not directly connected with each other, both showed an outbreak of enteric fever at nearly the same time, leading to the supposition that there must be some common cause for this simultaneous outbreak, and it was also noted that the two places had the same water supply. Further, it was noted that this water supply was from two gathering grounds, distinguished as "high level" and "low level," the latter the most recently taken up and the best in the conditions of its gathering ground; and statistical returns showed that the number of cases was much higher (the proportion being 4.5 to 1) in the portions of the districts furnished with the high-level water than in that supplied with the low-level water. This is the broad statement of the case, into which however the report goes much more fully and in more detail than we can indicate here, and with several tables showing the various relations between the health and the circumstances of water supply in the two places principally concerned. As to the nature of the defects in the water supply, the description of the gathering ground for the higher water supply may be partly quoted:—

"The Ulley gathering grounds comprise an area of about 2,200 acres, and, like the Dalton, are formed by two convergent valleys. Only a small proportion of the land constituting these gathering grounds is unencultivated. It mostly consists, in tolerably equal parts, of pasture and arable land, much of which, down to the very margin of the streams threading their way to the reservoir, was at the time of my visit covered with manure. This manure consisted, in at least one instance that I observed, of nightsoil and ashes. Several villages are situated within the gathering ground. Two of these, however, viz., Morthen and Brampton, do not appear to directly pollute the water supply, inasmuch as Morthen is drained into cesspools, and, except for one house, Brampton drains out of the Ulley watershed. Other villages, however, viz., Ulley, Aughton, Aston, and Aston Netherthorpe, are obvious and serious causes of pollution to the water taken from these gathering grounds. The drainage of the village of Ulley, with the exception of what is lost in the ground surrounding the village, passes directly into a stream which flows down to the reservoir. This drainage consists of liquid refuse from house-yards, farm-yards, and sinks. In Aughton and Aston house drainage has, by means of intercepting sewers, been conveyed out of the watershed, but yard drainage is still allowed to flow down fields constituting part of the gathering ground. This yard drainage consists not merely of rain-water and yard washings, it is contaminated by farm-yard refuse and by part of the house-slops, which are frequently thrown down the yard gratings."

The report concludes with the remark that the facts, as ascertained, "deserve the serious consideration of the Town Council in connexion with the question of the water-supply of the districts reported on." We hope the hint will not be lost sight of by that body.

AS there are conferences on most subjects nowadays, there is no reason why people should not meet and discuss coffee taverns, which have been the subject of a conference this week at Lancaster. The more these useful institutions are made known the better, but we strongly object to coffee taverns being regarded and discussed

from the philanthropic point of view. They should be considered solely as sound and wholesome business concerns, required for the use and well-being of the inhabitants of town or village. To workmen they are a great boon, and, properly managed, there is no doubt that, where any considerable body of artisans are collected, they can always be made to pay. The odd thing is that when people are always on the lookout to start new concerns, enterprising men do not establish coffee taverns wherever an opportunity offers. There are numerous localities where coffee taverns could be profitably established. Further, there can be no doubt that they should always be open for certain portions of a Sunday. Many working men who use them require them as much, if not more, on this day as on any, and the convenience and well-being of those who use them require that they should not be closed on Sundays. As a counterpoise to the public-house, the coffee tavern can never be thoroughly effective till it is open on Sundays. The man who is driven to the public-house on a Sunday will often not return to the coffee tavern on Monday.

THE Liverpool Architectural Society is establishing classes for assisting the professional education of architectural students during the coming winter months. The classes will be free to students joining the Society, and are intended to be a preparation for the R.I.B.A. examinations; and an examination will be held at the close of the session, and prizes awarded by the Council. The subjects to be studied are Sanitation; Stresses in Structures and Shoring; Building Construction; Specifications and Quantities; History of Architecture; and Mouldings, Features, and Ornament. It appears therefore that this important provincial Society has practically adopted the views of the Institute in regard to architectural education; and probably others will see the desirability of following its example.*

MANY of our readers will be interested to know that Miss Emily Penrose, a daughter of the author of "The Principles of Athenian Architecture," has been also engaged in the serious study of Greek archaeology, and is intending to deliver a course of lectures on Greek vases in the British Museum, on October 15 and 25, and November 1. She is also desirous to form a class for the study of vase paintings. Miss Penrose's name will ensure a favourable hearing at the outset for a lecturer who may be expected to inherit a faculty for accurate perception and logical deduction in matters relating to Greek art.

THE visit of the Architectural Association to St. Albans Abbey to-day (Saturday), under the guidance of Mr. Neale, who has such an exceptional acquaintance with those portions of the ancient building which are still left, ought to be a very interesting and instructive excursion. Mr. Neale proposes to limit his remarks "to works executed before the dissolution and still existing." A chronological list of these portions of the Abbey has been printed for the use of those joining the excursion. But why did not the Association invite Lord Grimthorpe to follow with a lecture on the beauties and peculiarities of the new work at the Abbey? They might thus have added amusement to instruction.

SALE OF LAND, TANKERTON-ON-SEA.—Mr. T. G. Wheatley held a land sale last week at this new watering-place, near Whitstable. About fifty plots were offered, and found ready buyers at prices ranging from 23*l.* to 55*l.* per plot. Another sale will be held on October 12 next.

* The following are the names of the gentlemen appointed to lecture on the various subjects:— "Stresses in Structures," and "Shoring," Mr. J. Dow; "History of Architecture," Mr. H. W. Reed; "Building Construction," Mr. David Lyon; "Specifications and Quantities," Mr. H. L. Beckwith, F.S.I.; "Mouldings, Features, and Ornament," Mr. C. E. Deacon, F.R.I.B.A.; "Sanitation," Mr. T. Harriet Harrison, F.R.I.B.A.

LETTER FROM PARIS.

THE 22nd of September was not only the annual national fête, but the centenary of the proclamation of the Republic, and the Paris authorities determined to solemnise the occasion in a special manner, by reviving the ancient custom of historic processional cars in honour of the epoch of the first Revolution. One is obliged to admit that the result was not very happy, and suggests the proverbial reflection, "Autres temps, autres mœurs." The design of the cars had been entrusted, it is true, to some of the first theatrical decorators of the day, —MM. Rubé, Chapron, Carpezat and others whose reputation is European and whose talent is quite above mediocrity. But, whatever might be said of the richness of the decorations and costumes, and the ingenuity of some of the details, somehow in broad daylight the things looked uninteresting and out of season. It needs the artificial glare of the footlights to bring such things into proper keeping, and the cars did not in themselves realise all that might be wished from that kind of design. For the "Marseillaise" car, for instance, instead of a mediocre fac-simile of the splendid figure of Raude, it would have been far better to have commissioned an original composition from a modern master. It would have required the *verve* of Dalou or Falguière to give the crowd anything like a new and powerful sensation.

In spite of this, however, the general success of the fête did honour to the resources and management of M. Bouvard, the new "Inspector-Général d'Architecture" to the Municipality, who has proved himself a worthy successor to Alphand in this kind of organisation. Thanks to his management, everything passed off admirably in the midst of a compact and enthusiastic crowd. In order that the north and south quarters of Paris might share equally in the spectacle, he had organised two processions identical in design, with the same figuration, the same costumes, and the same cars. These last, five for each procession, have been diversely appreciated. To our thinking, that of the eighteenth century was the best and the most decorative, a piquant work of MM. Amable and Gardy, inspired by the "plateformes roulantes" formerly employed in the fêtes given for the marriages of the Dauphins of France. Naturally the crowd preferred the Marseillaise car by M. Lemeunier, which we thought too heavy and massive. The car of the "Chant du Départ," of gigantic proportion, formed a triumphal arch surmounted by a figure of fine design. It was the work of M. Jambon. The car of the "Apothéose de la République," by M. Carpezat, presented the appearance of an antique trireme surmounted by a colossal statue of the République, badly coloured; it would have been better to give it the appearance of marble or of bronze. Lastly, the car "De la Concorde et de la Paix," by MM. Rubé and Chapron, was of a sober and severe architecture set off with ornaments in very classic taste. The other accessories of the procession hardly call for remark.

The fête day opened by an official ceremony in the Panthéon. There too there was much to criticise. In England the great churches of Westminster and St. Paul's have been made use of as the receptacles of monuments to great men, without destroying the essentially religious use and character of the buildings. At Paris, the transformation of the Eglise Ste. Gèneviève into a secular Temple of Fame gave one a discordant sensation. One does not find in that building despoiled of its altar, but with a decoration which at every step recalls the recollections of its religious origin, that sentiment of holiness which ought to prevail where the memory of the dead is celebrated; there is no harmony between the decorative treatment and the actual use of the monument. The organisers of the ceremony seem rather to have felt this, and the paintings were made to disappear in part behind hangings of Gobelins tapestry. But, by a singular coincidence, one could see, above the official platform where the speakers were celebrating the first Revolution, in the apotheosis subject painted long ago by Gros, the figure of Louis XVI, the most august victim of the Revolution.

We may remark, while speaking of the Panthéon, on the bad effect of the pendentives of the cupola painted by Carvallo from the designs of Gerard, and which appear terribly heavy and dark in their setting of white stone. This defect appeared the more apparent from the fact that the writer had been studying not



long before the effect of the mosaics in the pendentives of St. Paul's, the gold backgrounds of which harmonise much better with the masonry, and do not give, as at the Pantheon, the sensation of a cupola cut short and in danger of falling.

Paris has received recently the visit of the members of the "Library Association," the nineteenth congress of which was opened in the Hemicycle des Beaux-Arts. The visitors were received everywhere with great cordiality, and they accepted an invitation from the Duc d'Anmale to visit Chantilly, the library of which is so celebrated, and where the owner personally received the party. Since the gift of the chateau to the Institute, or rather the announcement that it will belong to the nation through that body, everything there has been much changed. The Prince affects to be no more "chez lui" there; that is to say, he has reduced his apartments, suppressed the "Salle de Spectacle," and made many other modifications in view of the new destination of the building. The artistic collections bear already the title "Musée Condé," and the monogram M.C., ornamented with the Royal fleur-de-lis, is to be seen everywhere. There is certainly a fine example in this spectacle of the "grand seigneur" transforming the palace of his ancestors into a museum, which he is continuing to enrich by frequent new acquisitions for the instruction of the democracy of the future.

For some years the Radical majority of the Municipal Council has been endeavouring to obtain the demolition of the "Chapelle expiatoire," the existence of which it professes to regard as an insult to the Republic. So far, however, the Government has refused to give it this satisfaction. It is now announced that the question is about to enter on a new phase. After the example of the Copts, who occupy the chapel of the Luxembourg; the Roumanians, who have the ancient chapel of St. Jean de Beauvais; and the Greeks, who worship in St. Julien le Pauvre; the Armenians, who are tolerably numerous in Paris, solicit the favour of celebrating their religious ceremonies in the monument which Louis XVIII. caused to be erected by Fontaine on the site of the burial-place of Louis XVI. and Marie Antoinette. By granting this request, the Government

will put an end to the constant demands of the Radicals for the destruction of the building.

A piece of artistic news of some interest may be mentioned. M. Jas. Tissot—well known in London, where he lived a good many years and whose society types he reproduced in many pictures—has, it is said, occupied a lengthy visit to Palestine with the tracing out the scenes connected with the life of Christ, and has already completed more than 200 pictures of a set which is to be still further extended. Those who have seen these works, so different from everything previously associated with the name of the painter, speak highly both of the learning and feeling displayed in them.

The Service des Beaux-Arts of Paris is about to take measures for securing, as matter of urgency, the immediate repair of various edifices of real artistic and archeological interest which, nevertheless, are not at present classed among those "Monuments Historiques" which are kept in repair at the national expense.

THE CHEYNE COURT, WINCHESTER.

This old building has just been converted into a dwelling-house, and the two lower windows take the place of small Jacobean ones; the insertion of the large doorway and the hocking up of the cramped entrance beside it being the only other alterations visible on this side. Messrs. John Colson & Son, architects, superintended the alterations, which were chiefly confined to the interior, and cost about 1,000*l.* It was here in former days that the Bishops administered justice. The prisoners' cell, now a wine-cellar, is at the back, where the outer wall, being part of the old city wall, is nearly 6 ft. thick. The timber work, all hidden by plaster till four years ago, dates from the fifteenth century, and is constructed of ship timbers.

CHURCH SCHOOLS, LANGLEY, WORCESTERSHIRE.—We are informed that the foundation-stone of new Church Schools, Langley, Worcestershire, was laid on Monday. These schools, when completed, will accommodate 400 children. The architect is Mr. P. B. Osborn, of Birmingham, and Mr. J. Light, of Langley, is the builder.

THE LONDON COUNTY COUNCIL.

THE first meeting of the London County Council after the vacation was held on Tuesday, at Spring-gardens, Mr. John Hutton, Chairman, presiding.

Resignation of Lord Hobhouse.—A letter was read by the Chairman from Lord Hobhouse resigning his position as Alderman, owing to falling health.

Mr. Charles Harrison, Vice-Chairman, said they all knew of Lord Hobhouse's great work in connexion with the municipal reforms which preceded the introduction of the Local Government Act. They were indebted to him for the wide knowledge he brought to bear not only on questions connected with London government, but on matters relating to the incidence of taxation, and particularly to the taxation of ground-rents. He moved a resolution recording the Council's sense of the valuable services rendered by Lord Hobhouse, and expressing regret at being deprived of the benefit of his experience.

Mr. Antrobus seconded the motion, which was agreed to unanimously, and Tuesday, October 11, was fixed as the day for electing an Alderman to fill the vacancy.

Tenders.—Several lists of tenders were received, which we give on another page.

Proposed New Bridge at Vauxhall.—The first part of the Bridges Committee's report referred to Vauxhall Bridge, and was as follows:—

"We desire to draw attention to the condition of this structure. The bridge was opened in 1876, and was built at a cost of 259,631*l.* and purchased by the Metropolitan Board of Works for 75,000*l.* It is composed of stone and cast-iron, and crosses the river by nine arches, each of 73 ft. span, supported by eight piers, each 13 ft. wide above low water level, the piers thus occupying about 104 ft. of the waterway, or about one-eighth of the total width of the river between the abutments. The length of the bridge between the abutments is 309 ft., and its width between the parapets 36 ft. 3 in., having a carriage-way 24 ft. and two footways each 6 ft. 1½ in. wide. The superstructure of each arch consists of ten cast-iron ribs 13 in. deep, spaced about 4 ft. apart, and they support the vertical cast-iron spandrel standards upon which rest the ribbed cast-iron plates which retain the macadam roadway filling. The heights of the soffits of the arches at the centre of the bridge

vary from 26.5 ft. to 17.0 ft. above Trinity high-water at the centre of the arches adjoining the abutments. The prevailing gradient over the bridge is about 1 in 35. The gradient on the Middlesex approach is 1 in 29, and that on the Surrey approach 1 in 31. Provided that the Council considers it desirable to reconstruct the bridge, and that the Thames Conservators consent to the lowering of the silt of the central arch to the extent allowed for New Putney and Battersea Bridges, viz., 20 ft. above Trinity high-water level, a considerable improvement might be effected in facilitating the passage of heavy traffic over the new bridge by the reduction of the service gradients to about 1 in 62, and by the adoption of wood paving instead of macadam. We desire to direct the attention of the Council to the condition of the foundations of three of the central piers of the bridge. The result of an examination of the foundations of these piers made by a diver in November, 1887, showed that the bottoms of the timber cradles upon which the piers are founded were in several places 4 in. or 5 in. above the level of the clay bed of the river adjoining them, and in the case of the third pier from the Middlesex side of the bridge the clay was found to have been scoured away from beneath the cradle 5 in. or 6 in. inwards from its outer edge. This action was at the time of the examination arrested by means of bags filled with cement laid along the sides of the cradles, and by the further deposition of 500 tons of slag around the piers; but a recent inspection has shown that the action of the tide is removing the protective works. The cutwaters of the piers are in a dilapidated condition. On comparing sections of the river bed in this locality taken in 1853 with those taken in 1875, it becomes evident that the bed of the river has been, and is, rapidly deepening. This action is the result of the great scour caused by the high velocity of the current through the central arches of the bridge, which velocity is considerably augmented by the obstruction caused by the thick piers to the passage of the upland and tidal waters. The ebb tide at times runs through some of the arches with a surface velocity of 7½ miles an hour, and is dangerous for navigation. Barges are occasionally carried on to the piers by the tide, and both are injured. In several instances lives have been lost. Moreover, the strength of the tide frequently hinders the progress of steam vessels passing under the bridge, and we may mention that we have witnessed this difficulty. With respect to the strength of the cast-iron arches, a concentrated live load of about 10 tons upon the centre of one rib of the arch is as much as is admissible, as this load produces a tensional strain on the bottom flange of about two tons per square inch. A concentrated live load of 16 tons at the centre of a rib produces a tensional strain along the bottom flange of the rib of nearly three and a half tons per square inch at the centre of the span, which is quite inadmissible as a working strain for cast-iron. The cast-iron plates which uphold the macadam may carry with safety a load of 4 or 5 tons per wheel, but the last-mentioned weight should not be exceeded as a working load. The traffic over this bridge has of late years much increased. The enlargement and alterations at Vauxhall Station, and the new condition of Lambeth Bridge, have greatly helped to swell the traffic. From returns which have been taken it appears that 22,332 vehicles crossed the bridge in the week ended June 17, 1879, and 34,915 during the week ended July 11, 1891; thus showing an increase of 13,583, or giving a daily average of 5,130 as against 3,190 in 1879. We have on several occasions received influential applications from the Council to proceed without delay to give the localities affected the desired relief, by rebuilding Vauxhall Bridge, in order to meet the growing requirements of the traffic, both by road and river. We are of opinion that this request is one that should be acceded to, and that the bridge to be constructed should meet not only the pressing needs of the present time, but those of future generations. The bridge which we suggest should take the place of the existing structure is a five-arch steel bridge with granite-faced piers and abutments, the width between the parapets being 80 ft. The cost of construction would be about 380,000. To accommodate the traffic during the rebuilding of Vauxhall Bridge, we propose that a wooden bridge, not less than 50 ft. wide, should be erected to cross from the extreme western end of the Albert Embankment to Millbank. The cost of this temporary bridge is estimated at 30,000. We recommend—

(a) That, subject to an estimate being submitted to the Council by the Finance Committee as required by the statute, Vauxhall Bridge be rebuilt and such temporary works as may be involved thereon.

(b) That the Parliamentary Committee in conference with the Bridges Committee be instructed to prepare a Bill to be introduced in the next session of Parliament, authorising the rebuilding of the bridge.

(c) That the Bridges Committee be empowered to prepare the necessary plans and estimates to be laid before Parliament.

The Hon. R. Grosvenor, in submitting the report, dwelt upon the great need that existed for the new bridge, and said that supposing the Council passed the recommendation that day, and the matter passed the House of Commons this year, the bridge could not be opened to the

public until somewhere near the end of 1896. Some members had asked why the committee had not recommended the construction of a granite bridge. The reason was because of the enormous difference in the initial cost. Their engineer estimated that the proposed steel bridge would cost 380,000, whereas a granite construction would cost 625,000.

Recommendation a was agreed to without discussion.

On recommendation b, Mr. Costello moved to add to the paragraph a direction to provide in the Bill that such proportion of the cost as may be equitable shall be raised by way of an improvement rate on the owners of ground values in the County of London, instead of the whole cost being thrown on the occupying ratepayer.

The Rev. Fleming Williams seconded the motion.

Mr. Beachcroft asked whether, in the event of this principle of taxation being rejected by Parliament, the improvement would not be taken.

Mr. Costello replied that in such an event the Council would have an opportunity of making known its wish.

Mr. Harben opposed the motion, and said he could not see how ground landlords could benefit by the mere widening of an already existing bridge.

Sir J. Lubbock said he regarded the proposal as nothing more than the re-affirmation of a principle laid down over and over again by the Council.

Mr. Grosvenor said he willingly accepted Mr. Costello's amendment, which was then agreed to.

On the motion of Mr. Taylor, it was resolved: "That it be referred to the Bridges Committee and Improvements Committee to arrange, if possible, that the bridge be constructed so that the Surrey side abutment shall give convenience of approach for any future extension of the Albert Embankment."

Recommendation b, as amended, was then agreed to.

Recommendation c was also passed.

Suspension of a District Surveyor.—The Chairman read a special report of the Building Act Committee, who drew attention to the case of Mr. H. Parsons, District Surveyor for South Lambeth, who was recently fined for travelling on the South-Western Railway Company's line without having paid his fare. The committee considered the matter of such gravity that they recommended that Mr. Parsons should be suspended pending the consideration of his conduct by the Committee.

The recommendation was at once agreed to.

Proposed Central Mortuary.—The consideration was resumed of the report of the Public Health and Housing Committee in reference to the proposed establishment of a central mortuary. In the report the Committee expressed the opinion that it was necessary to provide a mortuary in London for the preservation of unidentified bodies, and that it was practicable to do so in connexion with a local mortuary and coroner's court, and they recommended "That a joint Committee of the Public Health and Housing Committee and of the Public Control Committee be constituted for the purpose of formulating a scheme on the lines of this report."

Dr. Collins moved: "That the question of the provision of a central mortuary for unidentified bodies be deferred until the adequate provision of local mortuaries by the local authorities shall indicate how far such central mortuary is required, or otherwise."

This amendment was seconded by Captain James, and, after some discussion, carried.

Infectious Disease (Notification) Act, 1889.—It was resolved, on the recommendation of the same Committee, "that it is desirable in the interests of the community, that the Infectious Disease (Notification) Act, 1889, should be made compulsory throughout the United Kingdom."

Condition of the Thames.—The Main Drainage Committee brought up a report stating that between July 23 and September 17 the amount of sewage sludge taken from the outfall works at Barking out to sea exceeded 351,000 tons.

Lieut.-Colonel Ford asked whether there was any truth in a statement that had been made to the effect that in foggy weather the men in charge of the sludge ships dropped their load when half way down the river.

Mr. Howell Williams, the Chairman of the

Committee, said he had made inquiries, and found that there was no foundation for the allegation.

The Chairman called special attention to the following paragraph in the report of the committee:—

"We have received a report from the chemist stating that during the past summer the river Thames has been in a most satisfactory condition; that at no time has it been possible to detect the slightest discolouration of the water by sewage matter or black mud, and that the foreshores at all points have been clean. He further states that the aeration of the water has shown a marked increase, the quantity of oxygen dissolved in the water being on one occasion, August 31, the maximum quantity possible. The chemist adds that this satisfactory result, unassisted by any special atmospheric conditions, such as heavy spring rainfall, can be attributed to no other cause than the operations at the Council's sewage precipitation works."

The Proposed Cromwell-road Bridge.—The Improvements Committee's report contained the following paragraph and recommendation:—

"It will be within the recollection of the Council that in the last session of Parliament powers were sought for the construction of a bridge and approaches to connect West Cromwell-road, Kensington, with Talgarth-road, Fulham, but that the clauses relating to the bridge were withdrawn from the Council's Bill owing to the decision of the Select Committee of the House to omit from the preamble of the Bill the words relating to the 'improvement rate.' Since May last, when the clauses were withdrawn, the urgent necessity for the bridge has become more and more apparent; in fact, we feel that the work is one of such immediate necessity that it cannot be postponed without grave inconvenience. In these circumstances, we have decided to recommend the Council to renew its application to Parliament for powers to construct the bridge and approaches. We believe that the Council is so well acquainted with all the details (given fully in our report presented on June 2, 1891), and in subsequent reports of the Parliamentary Committee) that it is unnecessary for us to weary the Council by repeating them now, and we therefore propose to confine ourselves to our recommendation—

"That the application to Parliament for powers to construct Cromwell-road-bridge and approaches be renewed in the next session."

After some discussion this was agreed to.

Further Additions to Cane Hill Asylum.—The Asylums Committee reported that they had received three tenders for the additions to Cane Hill Asylum. Upon examination they found that none of the tenderers had complied with the conditions as to filling up the schedules of rates of pay. They thereupon adjourned the consideration for a week to give the tenderers an opportunity to fulfil the requirements. This having been done, they further considered the tenders, which appeared as follow:—

Joseph Potter, Horsham	£15,290
Morgan, Isted, & Morgan, Southampton ..	15,936
Reed, Blight, & Co., London	16,848

The usual inquiries as to the lowest tender, Mr. Potter, being satisfactory, they accepted his tender, and instructed the solicitor in complete the contract.

After transacting other business the Council adjourned soon after seven o'clock.

ASSOCIATION OF MUNICIPAL ENGINEERS AND SURVEYORS.—This Association held its annual congress this year at Belfast on Friday and Saturday, September 23 and 24. As we find it impossible in the present number to find space for more than a brief report, we have thought it would be of more interest to our readers to defer the report till next week, when we shall be able to give a considerable portion of two of the principal papers that were read.

THE BRITISH PRODUCTION OF STEEL IN 1892.—The statistics just issued by the British Iron Trade Association show that the output of Bessemer steel ingots in Great Britain during the first half of this year was only 649,816 tons, against 923,005 tons in the corresponding half of 1891; compared with the latter, it is a decrease of 273,189 tons, or 29.6 per cent. The production of Bessemer steel rails shows an even more serious falling-off, from 427,323 tons in 1891 to 211,834 tons in 1892, a decline of 215,739 tons, or 50 per cent. The chief cause of this decline was, no doubt, the stoppage of the fuel supply through the Durham miners' strike, for Cumberland produced 81,804 tons less, Cleveland 67,947 tons less, and Lancashire 33,959 tons less. The output of open-hearth steel in the six months was 722,341 tons, against 778,888 tons in the corresponding six months of 1891; decrease, 56,547 tons, or 7.28 per cent.



Winchester Cathedral and the Deanery. From a Sketch by Mr. G. H. Kitchin.

Illustrations.

WINCHESTER CATHEDRAL.*

BOTH Winchester and St. Alban's lay claim to be the longest Cathedral in England. Taking, however, the plan of St. Alban's published in the *Builder* in the present series, and the careful measurements taken by Mr. James Neale, and comparing them with the measurements taken expressly for the plan of Winchester which we give today, the result is to give the greater length to Winchester. St. Alban's Cathedral, from the interior of the west wall to the inside face of the east wall of the lady-chapel, is 521 ft. 13 in.,—that of Winchester 526 ft. 6 in. The projection of the porches westward is also greater at Winchester than at St. Alban's, but the best idea and fairest result to be obtained is by comparison of their internal lengths. This great length at Winchester is, as in the case of St. Alban's, one of its chief external features. The long line of roof cannot be considered picturesque in either case, and it is eastward of the tower that the exterior of Winchester assumes more the importance of architectural grouping, and the striking mixture of styles which renders our Medieval buildings so interesting, and which promises so much for variety on reaching the interior. The interior of the presbytery at Winchester is undoubtedly one of the finest architectural sights in England, and in many ways is similar to the arrangement at St. Alban's. These two great churches should, indeed, be taken and studied together, and the various ways in which the Norman church was developed and altered, compared. The Norman nave at Winchester was of even greater length than the existing one. Its western front, apparently

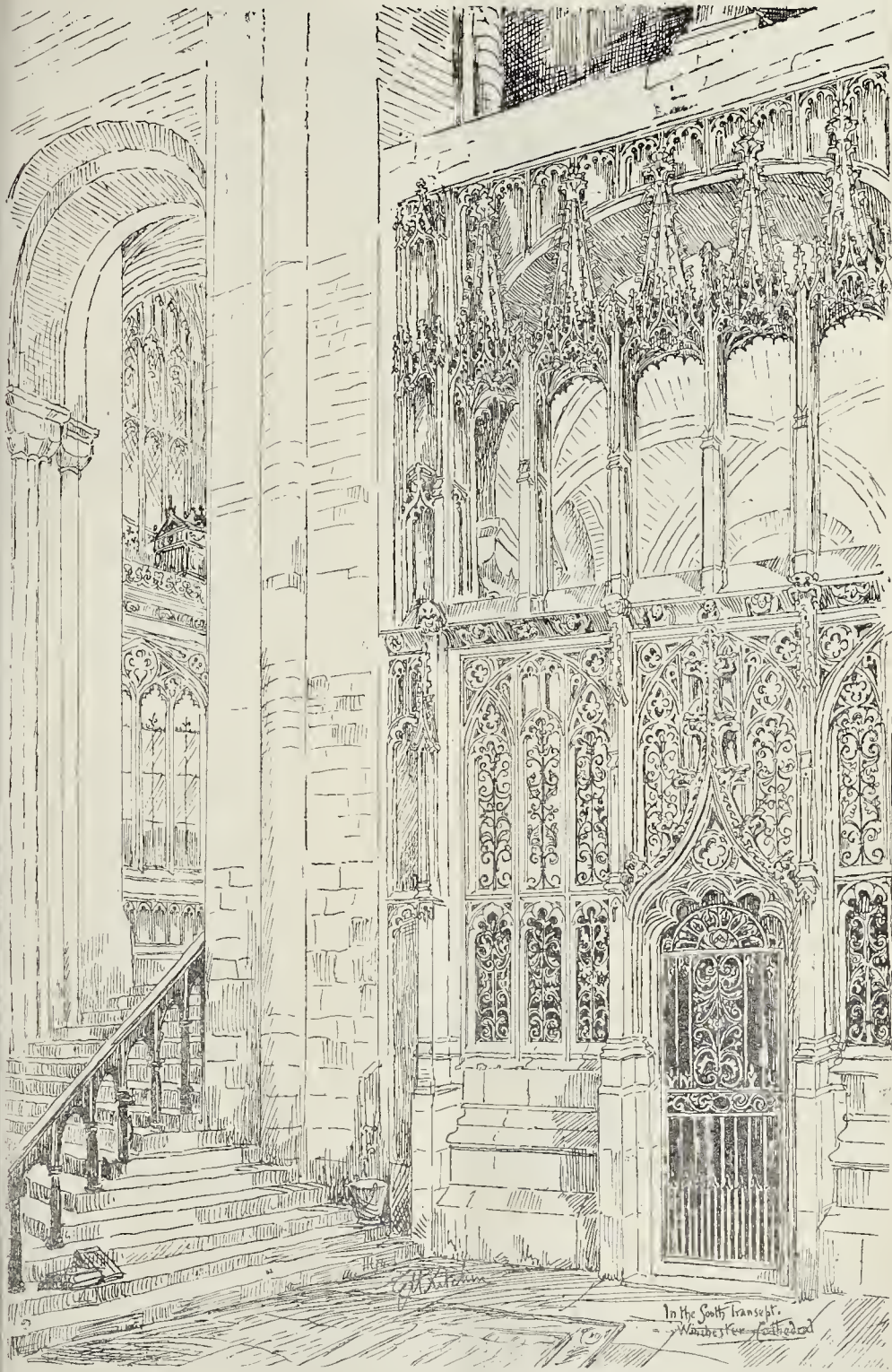
* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particular lists of future arrangements, will be found on page 272.

flanked by towers, was forty feet westward of the present porches. The eastern arm was, of course, shorter, and in this case apsidal, as at Peterborough. The form of the early eastern arm is still marked by the crypt, and in one instance in the church above, by the remains of a circular column in Bishop Gardiner's Chantry (see plan). The tower, like many other Norman structures, fell, and was rebuilt, and the fear of further catastrophe induced the builders to give them the priority in bulk of the tower piers of England. In the transepts the theorist will find ample scope for discussion as to the former arrangement and use of the returned aisle (the same arrangement that excavations discovered to have once existed at Ely), and its treatment above the arcade level. Various suggestions have been made, but so far no very satisfactory result has been attained. The central tower and its piers, the transepts, crypt, fragments of the presbytery, and the ruins of the chapter house on the south, with the slype between, are thus all we have at present visible of the church founded by Walkelyn in 1079, and dedicated July 15, 1093. To this, in succeeding styles, builders have altered and added, the elongation of the presbytery, as in so many other cases, being the chief work of development.

De Lucy (Bishop, 1189-1204) commenced rebuilding the presbytery, his work being eastward of the Norman building (leaving the latter thus undisturbed as long as was practicable), and in Decorated times the presbytery itself was rebuilt, the Norman work (except the crypt) being removed, and the new work planned, not to follow the spacing of the Norman nave, but yet so designed that it kept in its form a certain record of the earlier church. Hence the bending inwards of the bay between the great altar screen and the east window. De Lucy's work rendered some such scheme desirable, as his central alley was made narrower than that of the presbytery. What he would have done had his work extended to

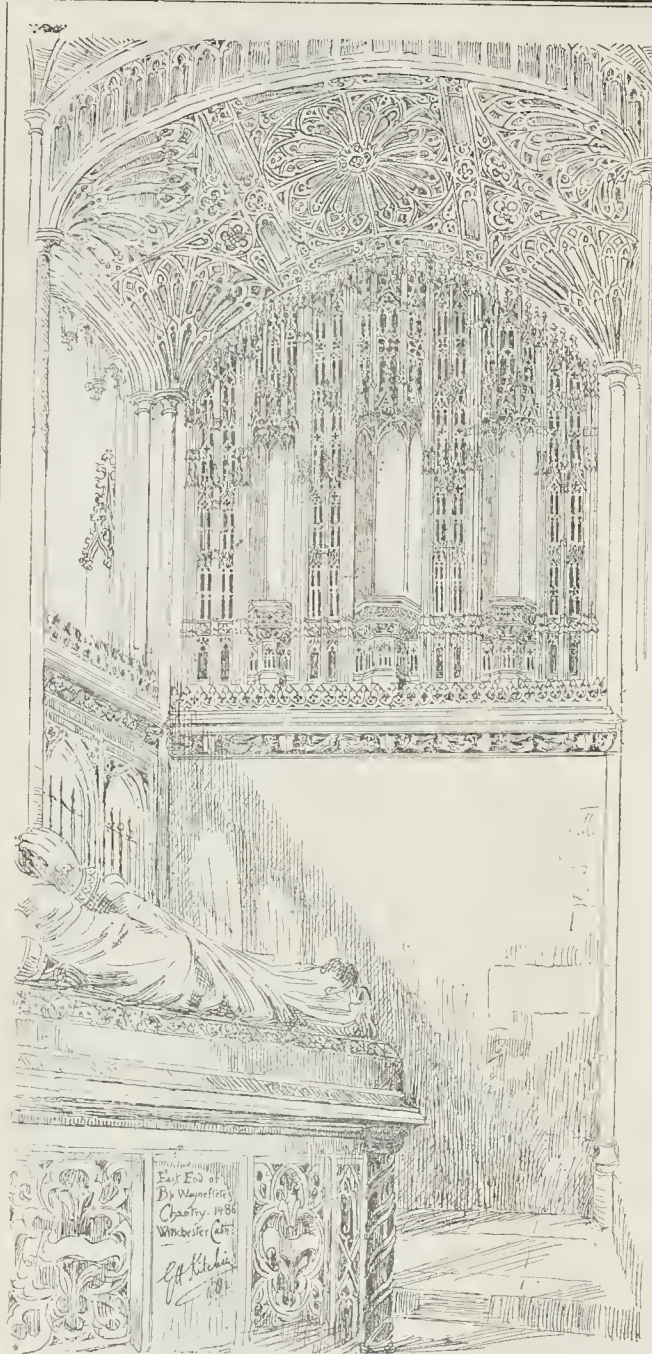
the remodelling of the Norman work we can only conjecture, but probably some arrangement, such as at Salisbury, with a triple or double arch behind the altar, was in his mind. We can scarcely, however, regret, that the arrangement as it exists was carried out. The result is far more picturesque and less stiff than the rectangular lines would have been, and gives a character to the east end of the church, both externally and internally, which it would have otherwise lacked. The next and the last works on any great scale were the rebuilding of the west end of the nave by Bishop Edington (1345-66), and the entire transformation of the nave by the great William of Wykeham (1367-1404). The first of these works entailed the removal of the Norman front, and, as we see by the plan, the western arm was shortened. Instead of two flanking towers, as at St. Alban's, or one great central one as at Ely (as the Norman foundations seem to suggest), the front now assumed a type more in character perhaps with a great parish church than a cathedral. The church at Edington, in Wiltshire, is, to our thinking, a finer and more successful conception, the west window and the treatment below it at Winchester being somewhat out of scale with the rest of the building. Bishop Edington also began remodelling the nave; and the two west bays of the north aisle, and the west bay on the south are in a great measure his work.

The second great work, that of Wykeham, was far larger in scale and grander in conception. He appears, according to the late Professor Willis (whose carefully-dated block plan we have taken as a guide for the various dates on the large ground plan here given), to have kept, in the eight columns on the south side of the nave, the original masonry of the Norman piers, their contour being altered to suit the style—Perpendicular—of the day. On account of labour entailed or expense, the scheme was apparently abandoned, and the older nave piers were refaced, the Norman core only being retained. The clever way in which the nave was



In the South transept.
Winchester Cathedral

Winchester Cathedral; View in South Transept. From a Sketch by Mr. G. H. Kitchen.



Winchester Cathedral: Wynnflete's Chantry. From a Sketch by Mr. G. H. Kitchen.

re-designed on the Norman basis, as it were, is an interesting study, and is fully given in Professor Willis's paper on the Architecture of the Cathedral, to which we refer our readers.*

With the rebuilding of the eastern hay of the lady-chapel, the various additions of importance come to an end, and the other develop-

* The Journal of the Archeological Institute; Winchester Meeting, 1845.

ments were in detail rather than in structure in fittings and shrines, and all the accessories which the church of a powerful establishment such as that at Winchester required for the due performance of its religious life. With the exception of portions of the late work in the presbytery, the exterior of Winchester is severe in treatment, and plain wall-space plays an important part in the design. Plain parapets

and simply-treated pinnacles characterise the work of the nave. The Norman transepts are externally but little altered, except by the insertion of Decorated windows to give more light to the altars in their eastern aisles; and De Lucy's work eastwards is, compared with some work of its date, simple in the extreme. Rather more elaboration was bestowed on the design of the new eastern hay of the Lady Chapel by Prior Silkested and Bishop Courtenay; but, taken as a whole, Winchester has one of the simplest exteriors for its size and importance in the country. On gaining the interior all is altered, and the richness, more particularly of the presbytery and its surroundings, are of the most elaborate nature. Unfortunately for its impressive effect, the rood screen has gone, and a modern copy of the choir stall canopies, serving as a choir screen, is the only object which breaks the view between the west end and the great rood. In this respect the interior of Winchester lacks the fine effect of St. Alban's, St. David's, and the Priory of Christchurch, in Hampshire, where the eye is led gradually from one feature to another, tending to increase in the imagination the idea of great length, which a perfectly open vista, such as is here and at Salisbury, utterly destroys.

Passing up the nave, if we cannot admire all the details of Wykeham's work, we can but hear tribute to the conception of the whole. Its lofty arcades give no space for triforium, and the proportion between the clearstory and the arcade is somewhat unsatisfactory. If we except the vaulted roof, and the chantry of the great Wykeham himself, and his predecessor Edington, this portion of the church may, with reason, be considered simple in its character, and bears distinct evidence of having been grafted on earlier work. The Norman columns still remain in one or two places towards the east end of the nave arcade (see plan), but with the exception of these and of the Norman masonry before alluded to as existing in the piers on the south, and, perhaps, portions of the aisle walls, all is transformed to Perpendicular detail. The tower arches and piers, and the transepts, remain Norman; the eastern portion is transformed into a mixture of Early English, Decorated, and Perpendicular, as before described.

The central and chief feature of the Presbytery is now, as it always was, the reredos. It has recently been restored throughout, and like that at St. Alban's, has had the niches for its statuary refilled. Of the three screens of the period, — St. Alban's; St. Saviour's, Southwark; and Winchester, — Winchester bears the palm for delicacy of carving and elaboration in design. Immediately behind the reredos, and approached from the sanctuary by a door on each side of the altar, is the space known as the Feretory, with a raised platform approached by four steps on either side, opposite the doors in the reredos. It is absolutely devoid of decoration inside, but its east wall is richly ornamented with canopied niches of Decorated date, once containing a long series of statues of kings and queens, whose names are still partly legible below the pedestals. The raised platform before mentioned has what has been suggested to be the earlier high altar before the reredos was built. Its appearance and position certainly suggest something of the kind, but there seems to be no direct evidence that this was so. It is now used as a museum and receptacle for the carved work that has been found at various times about the Cathedral, amongst which are some very delicately-moulded heads and cresting, besides a portion of a painted chest with armorial bearings and figure subjects.

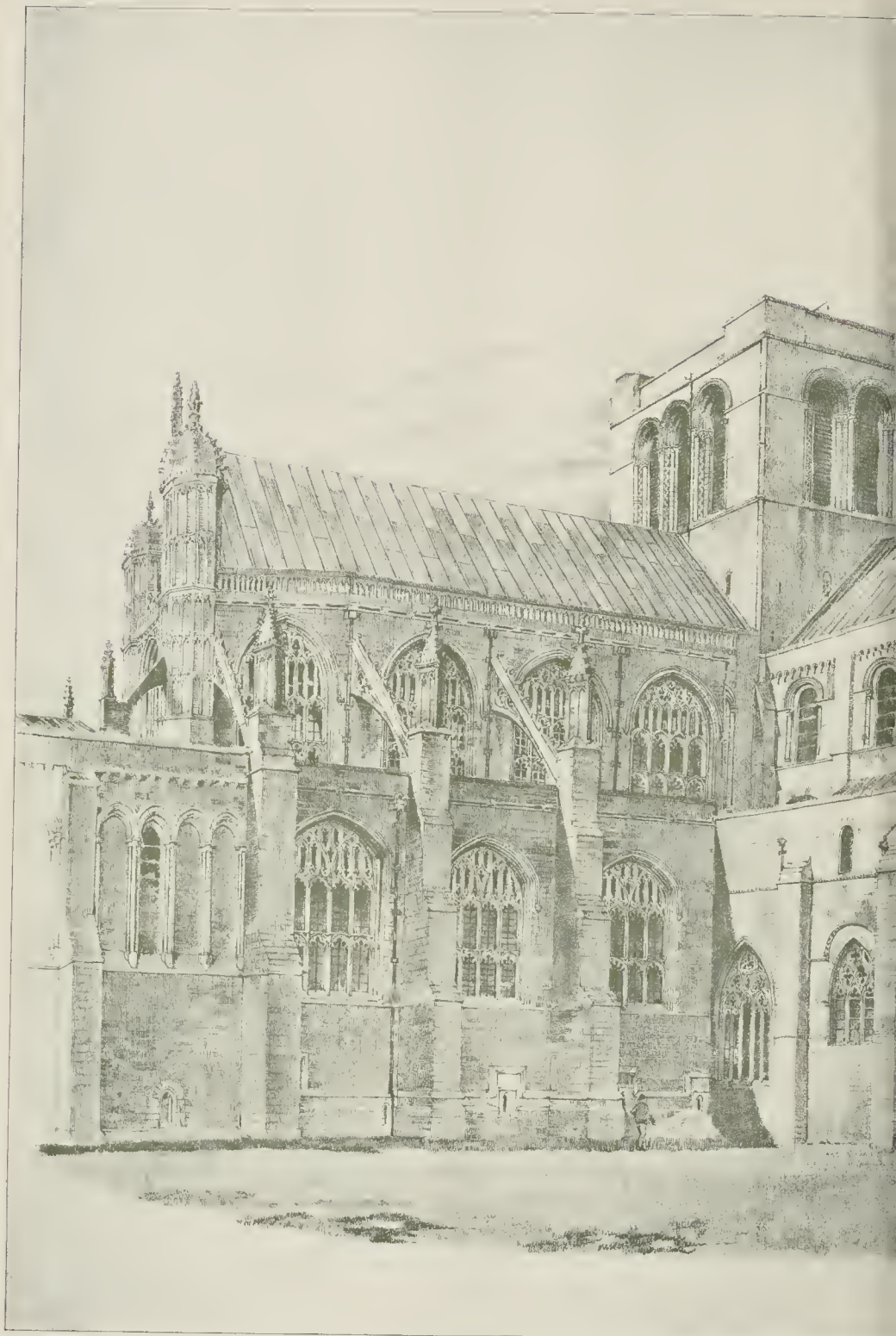
Flanking the Feretory are the Shrines of Bishops Gardiner and Fox, — the former on the north side, the latter on the south. Fox's chantry is the most beautiful in its detail of all the chantries in the Cathedral. It was built at a time when the Renaissance was just beginning to affect the architecture of the day, and there is a freedom about some of the carving and detail which is very charming. Over the altar was a small reredos in a sunk panel (now empty), and over this a band of angels holding shields bearing the emblems of the Passion. These retain their colour in a very perfect state. At the back was a little chamber with a cupboard. Bishop Gardiner's chantry is a much later structure, curiously retaining the general forms of Gothic with the details and mouldings of the Renaissance. In this chantry, below the general level of its floor, is now visible

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Cathedrals of

No. 23. WINCHESTER. FROM THE NORTH



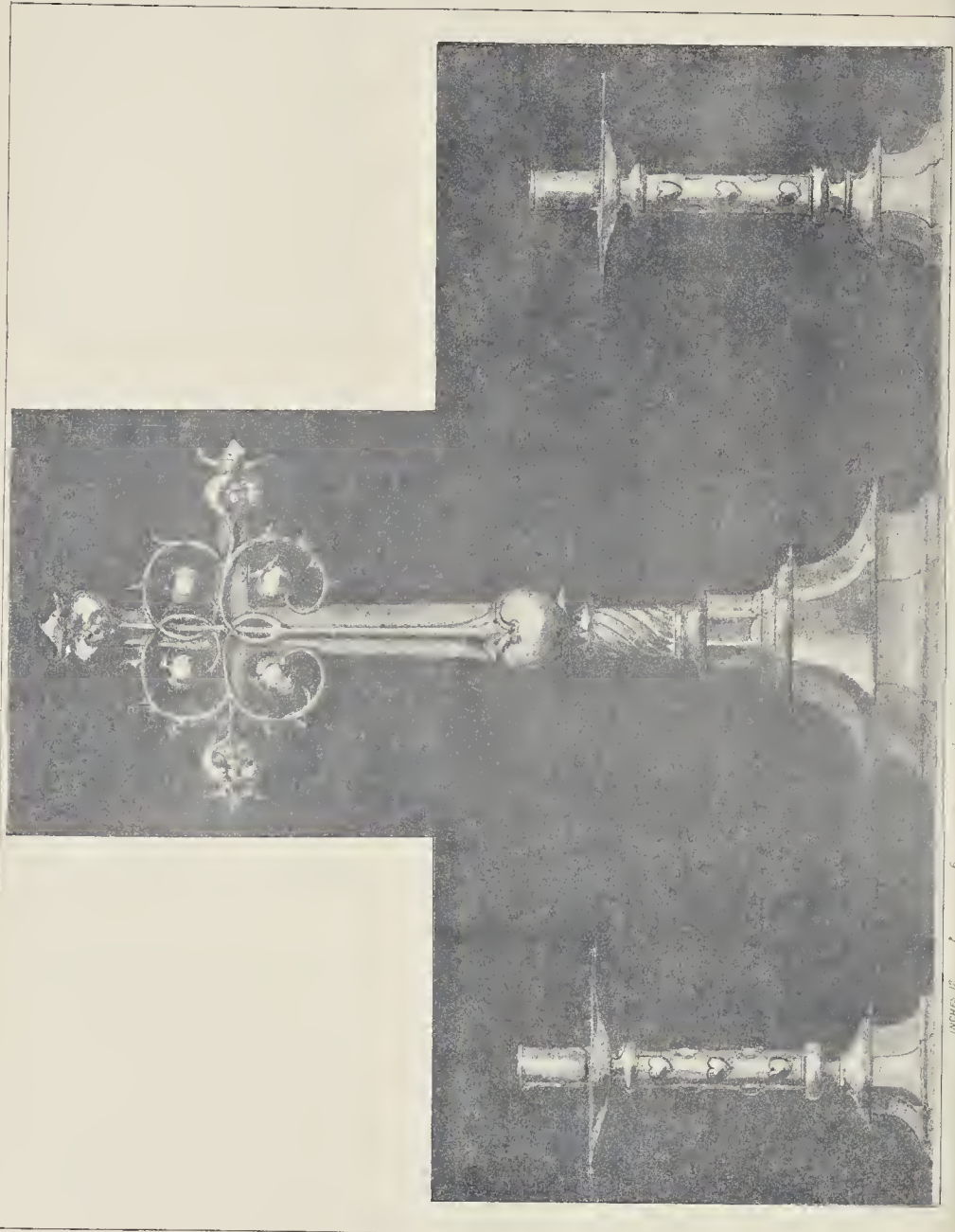
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nd and Wales.

DRAWN BY MR. A. NEEDHAM WILSON, A.R.I.B.A.



THE BUILDER, OCTOBER 1, 1892.



2 FEET

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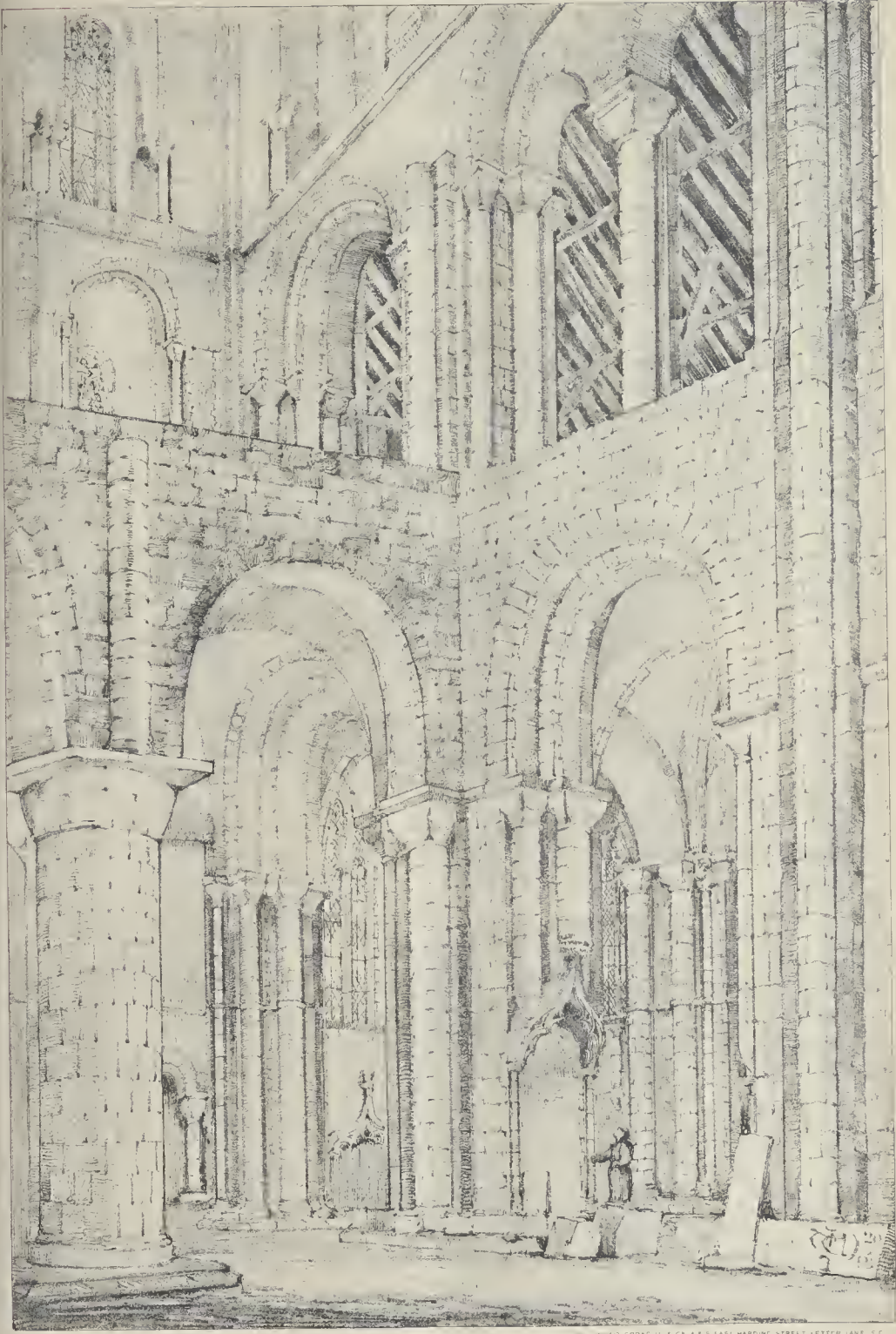




A. Needham Wilson
Sep 1892

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VIEW IN THE NAVE WINCHESTER CATHEDRAL (LOOKING SOUTH-WEST)—DRAWN BY MR A. NEEDHAM WILSON, A.R.I.B.A.

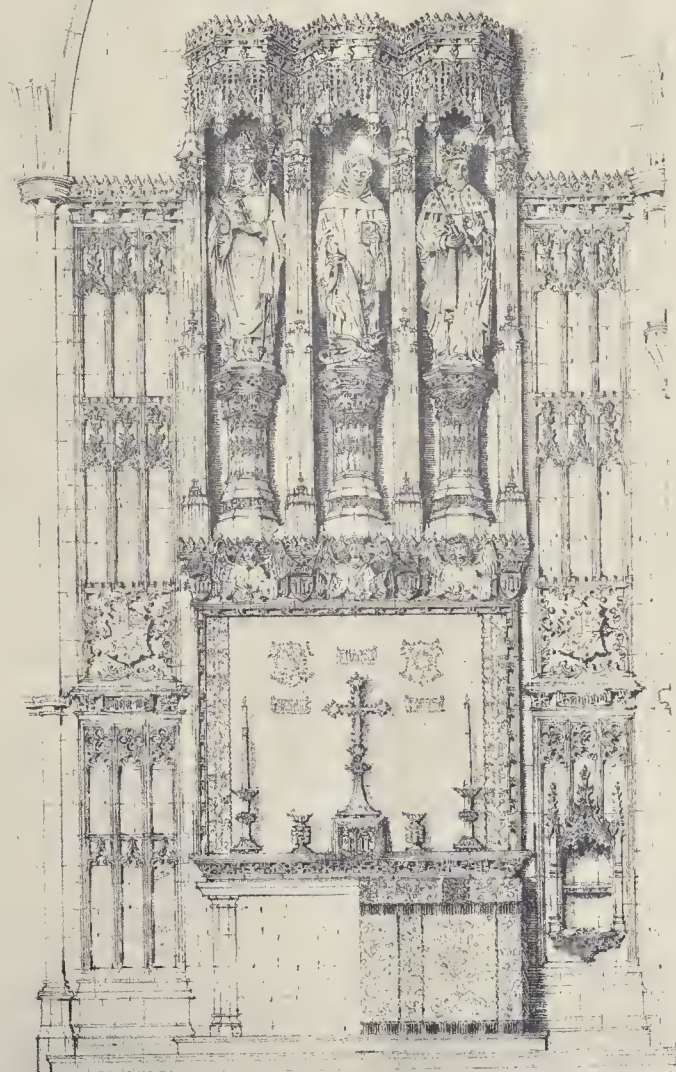


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THE NORTH TRANSEPT, WINCHESTER CATHEDRAL.—DRAWN BY MR. W. A. PITE, F.R.I.B.A.

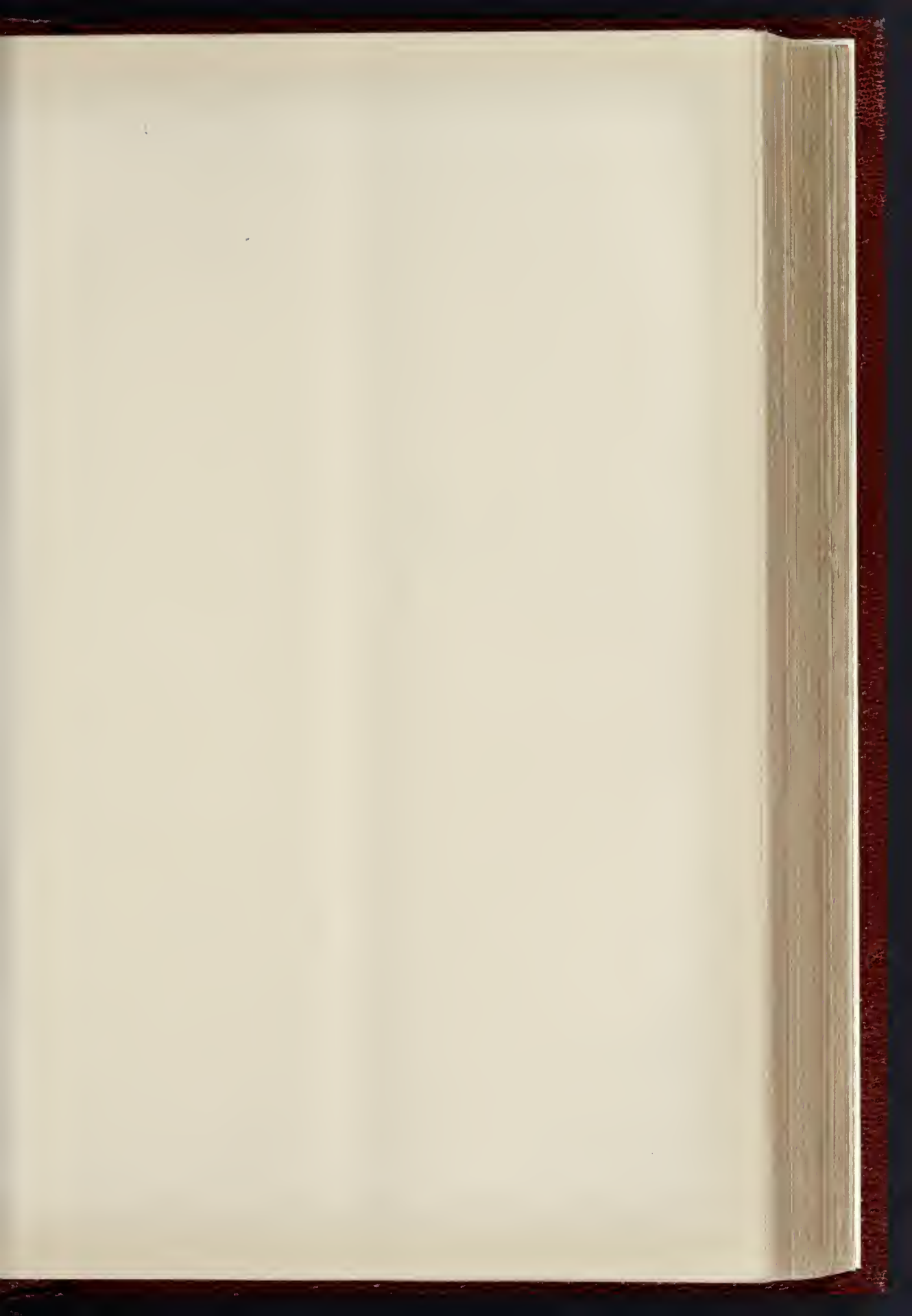
ST ALBAN, CH. WIDDINGTON.

STONE REREDOS FOR SOUTH TRANSEPT.



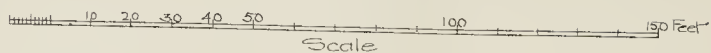
A. H. Skipton Architect
5, Staple Inn, London.

THE PHOTO ENGRAVE & CO. 4 & 5, EAST HINDING STREET, FETTER LANE, E.C.



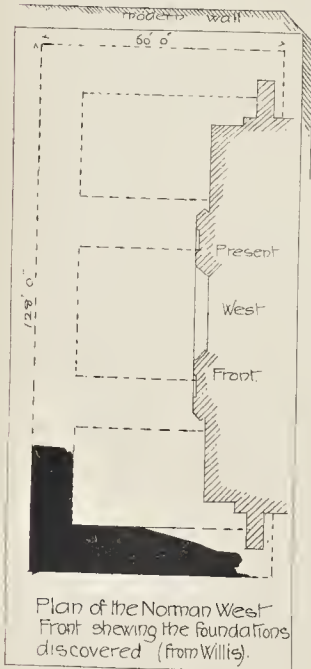
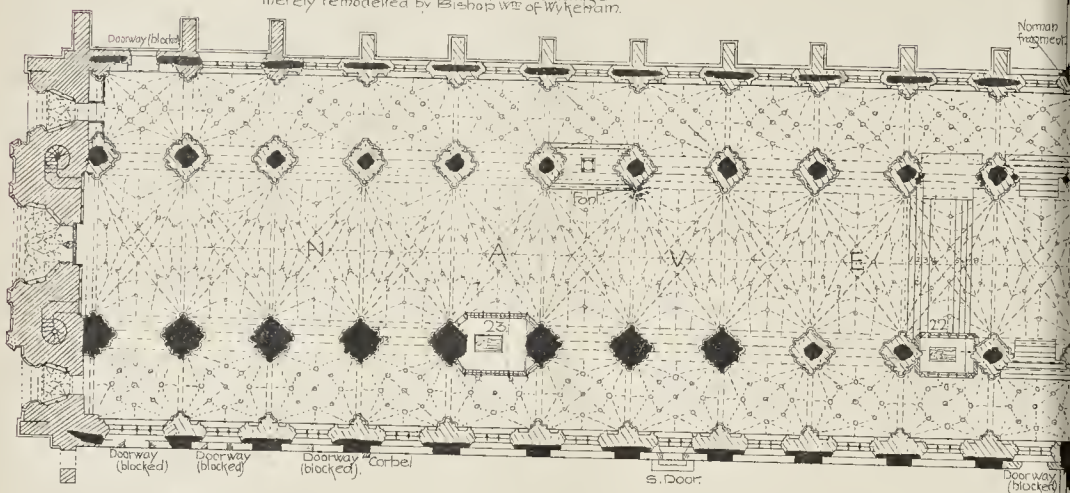
WINCHESTER CATHEDRAL

GROUND PLAN.



Note: The columns of south arcade of Nave shewn black are those given by Prof Willis as being Norman masonry throughout the mouldings merely remodelled by Bishop W^m of Wykeham.

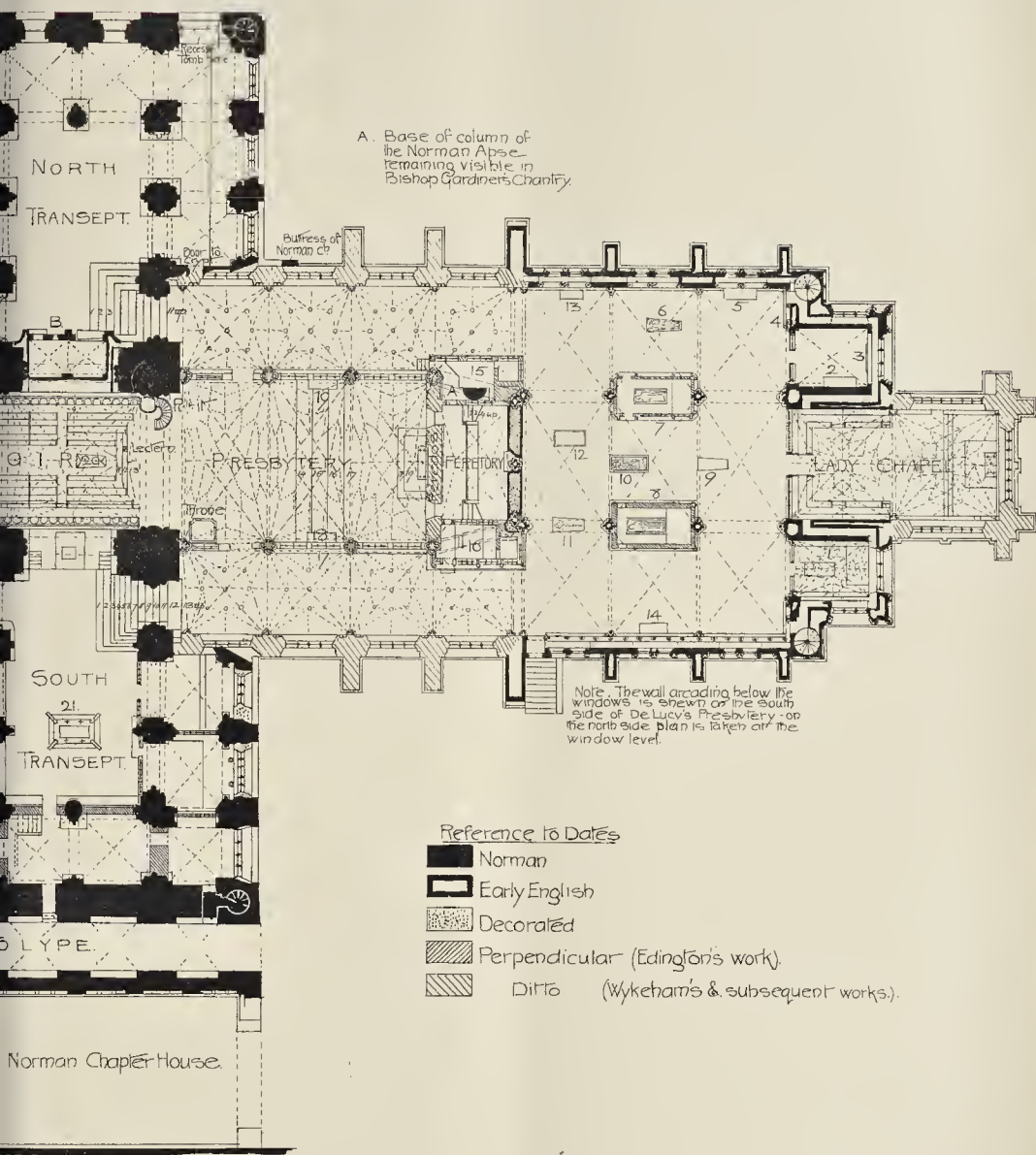
B. Chapel of the Holy Sepulchre (with Fresco paintings)



Site of the Cloister Quadrangle.

Monuments.

1. Chapel & Tomb of Bishop Thos. Langton (1493-1501).
2. R. Weston, Earl of Portland.
3. Portion of a tomb in wall.
4. Effigy in a Vesica
5. Monument to Masson family (1609)
6. Effigy of a Bishop.
7. Chantry & Tomb of Bishop W^m Waynefleet (1447-1486).
8. " " " Cardinal Beaufort (1404-1447).
9. Plain Tomb (coffin shaped).
10. Effigy of a knight.
11. Prior W^m de Basinge
12. Bishop Sumner (1827-1874)
13. Part of an effigy.
14. Sir John Clobery 1637.
15. Chantry, Chapel of Bishop Stephen Gardiner (1531-1555)
16. " " " Fox (1501-1523)
17. Richard, son of W^m the Conqueror.
18. Bishop Courtenay (1492) - Restored.
19. Bishop John de Pontissara
20. King William Rufus.
21. Bishop Wilberforce
22. Chantry & Tomb of Bishop Edington.
23. " " " " William of Wykeham



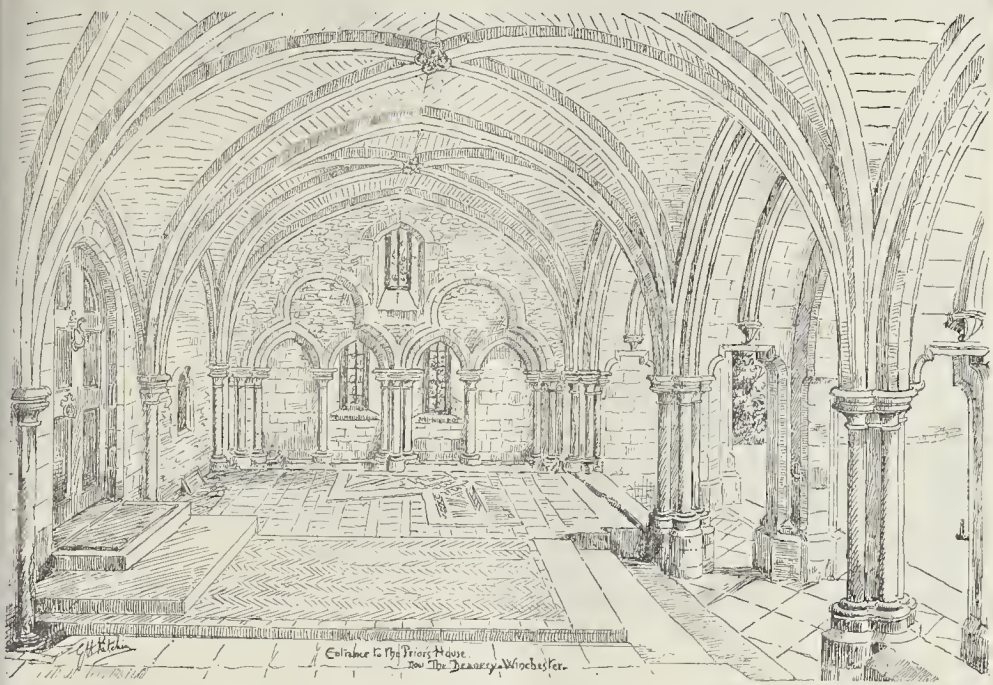
A. Base of column of the Norman Abse. remaining visible in Bishop Gardiner's Chantry.

Note. The wall arcading below the windows is shown on the south side of De Lucy's Presbytery - on the north side plan is taken at the window level.

Reference to Dates

- Norman
- Early English
- Decorated
- Perpendicular (Edington's work).
- Ditto (Wykeham's & subsequent works).

*Refract to Paul
11th or 12th 1892.*



Entrance to the Deanery, Winchester. From a Sketch by Mr. G. H. Kitchen.

the base of one of the columns which supported the Norman apse (see ante), interesting as being the only remains of the eastern arm which we have above the crypt level.

Passing eastward of this Feretory, we come to De Lucy's work, simply arched below, and lighted by pairs of lancets above, with the rear arches carried in groups of detached shafts. On either side of the central aisle are the chantries of William of Waynflete and Cardinal Beaufort,—north and south respectively,—perpendicular structures with elaborate canopies and vaulting, but neither of them remarkable for refinement of detail. Taken together, however, with Fox's and Gardiner's chantries and the smaller monuments, they make an imposing group, hacked by the darker lines of the woodwork in Langton's and the Lady Chapel. Between the shrines is a good effigy of a cross-legged knight with shield, bearing arms, in fine preservation. There are also one or two earlier memorials of bishops, William of Basinge, and another unknown. The floor here is laid with old tiles, mostly foliage patterns. The Lady Chapel itself is partly Early English and partly (the eastern of the two bays) perpendicular. It retains still traces of a series of frescoes on the walls of the later portion dealing with scenes from the Life of the Virgin, more remarkable for their curious,—and sometimes had,—drawing, than for any artistic value. At the entrance from De Lucy's aisles is the screen, and the stalls in the chapel remain and are very good. Bishop Langton's chapel lies on the south side of the Lady Chapel and is a continuation of De Lucy's aisle, the walls indeed are his, and the early vaulting shafts remain, but the vaulting and the fittings and screen are all late in date; very beautiful in detail, especially in the execution of the heraldry which appears on the entrance door, and the back of the stallwork.

The chapel on the north side of the Lady Chapel,—known as the Guardian Angel's chapel,—contains nothing of much interest beyond the paintings on the early vaulting (which here remains) and one side of a Decorated tomb built into the east wall.

Space does not permit of a detailed description of all the points of interest in the building, but attention may be drawn to the following:—

the ironwork on Wykeham's chantry; the Norman font in the nave, with its curious carvings; a later Renaissance monument on the north side of the sanctuary; the fine Decorated stallwork with miserere, and some later fronts with excellently designed panels; the coper tomb in the choir, said to be that of William Rufus, and the gallery known as the "Minstrel's Gallery" over the western bay of the north aisle of the nave. There is, besides this, a mine of decorative work in the various shrines and Fox's screens enclosing the presbytery, and on the curious little painted chests over them, said to contain the bones of the Saxon kings; and fine remains of glass in very perfect condition in the clearstory windows of the sanctuary.

The whole of the choir and presbytery obtains much additional dignity from being considerably raised above the nave. There are eight steps from the nave to the choir screen, and eleven more to the altar, giving a total of nineteen in all. The transepts are on a level with the nave, long flights of steps leading from them to the aisles of the presbytery. It is almost needless to add that this raising of the eastern portion of the church was due to the existence of the Norman crypt, and is similar to the examples at Canterbury and Rochester.

Of the buildings surrounding the Cathedral the cloisters have been destroyed, and only a fragment of the west front of the Chapter-house (Norman) and the foundations of its walls remain. The slype between this and the church exists, with a later building over it, approached by steps from the south transept. The present Deanery was a portion of the Prior's house, and there are sundry fragments about the Close, but nothing of any great importance. The interest at Winchester centres round the Cathedral itself, its shrines, and the histories of the men who each added their quantum of skill towards the beautifying of the fabric, and who, in some cases, erected their chantry chapel during their life-time in order that their bodies might have a fitting resting-place in the building which they had helped to make, and which still remains, one of the most interesting and valuable in the country.

ALTAR CROSS AND CANDLESTICKS FOR THE PARISH CHURCH OF CARSHALTON.

THESE are to be executed in brass. The upper part of the cross, above the octagon base, to be in hammered work; the base itself to be cast. The design and drawing are by Mr. Reginald Blomfield.

The church, with the exception of the old chancel, tower, and south aisle, is now being rebuilt on a very much larger scale from the designs of Sir Arthur Blomfield and Mr. Reginald Blomfield conjointly.

The drawing from which the illustration is taken was exhibited at the Royal Academy this year.

PEREDES IN SOUTH TRANSEPT, ST. ALBAN'S CHURCH, TEDDINGTON.

THIS work was executed entirely in Ancaster stone by Mr. L. A. Turner, of London. The central niches were, by request, adapted from Henry VII.'s chapel. Mr. A. H. Skipworth is the architect. The drawing from which it is taken was exhibited at the Royal Academy this year.

NEW POLYTECHNIC INSTITUTE, BOROUGH-ROAD.—The new Polytechnic Institute, situated in the Borough-road, Southwark, has just been completed. The buildings forming the new institute were formerly used by the British and Foreign Schools Society as a residential training college. To adapt them to their present purposes a considerable amount of structural alteration was necessitated. The whole of the site—which is about seven-eighths of an acre in extent—has not been covered, space being reserved for the building, as funds become available, of a swimming bath and gymnasium, a hall for lectures, concerts, &c., and three workshops. On the ground floor of the new institute are a library, a social-room and refreshment-room for men, and a commodious reading room. On the same floor, but at the opposite side of the building to that in which are situated the apartments to be used by men, are refreshment and recreation-rooms for women, who obtain access to their portion of the institute by a separate entrance. A gymnasium divides the two sets of apartments. On the other floors of the building are a lecture-room capable of accommodating some 350 people, class-rooms, lavatories, baths, and cloak-rooms. The alterations have been carried out from the designs of Mr. Rowland Plambe.



Old Houses, Bermondsey: about to be pulled down.

OLD HOUSES, BERMONDSEY.

WE give an illustration of the sixteenth-century houses in Bermondsey-street which are condemned and will shortly be pulled down. Very little is known of their history; they stand upon what was formerly the site of King John's barracks, for, as is well known, that king at one time had a residence in Bermondsey. Under one of them, it is reported, is an entrance to a subterranean way, of which there are known to have been several in this district connected with the old Abbey of Bermondsey; more may yet be heard of this, and possibly other objects of interest may be brought to light when the houses are demolished. The floors of the shops are several steps below the pavement, and the entrances in some cases are very low.

Upon what is now covered by Bermondsey-square, the Long-walk, and Grange-walk, formerly stood the Abbey of Bermondsey (St. Saviour; Benedictine, 1082). The part occupied by Bermondsey-square is the site of the Abbey close, while at the entrance from Abbey-street stood the great gate-house. A little further to the north-west is the site of the west gate, and at the entrance to Grange-walk from the square stand the remains of another gate-house, in the walls of which still remain the pivots of the gate hinges. To the north of the Abbey stood the Conventual Church, the site of which is now covered by the houses in Abbey-street, opposite the disused graveyard of old Bermondsey Church.

The illustration is from a sketch made for us by Mr. J. A. Pywell.

RESTORATION OF HIPSWELL CHURCH, YORKSHIRE.—The Church of St. John the Evangelist, Hipswell, which during the past year has been restored, was reopened on the 14th ult. by the Bishop of Richmond. Altogether, when the porch is completed, the restoration will cost 1,200l. Mr. Charles Hodgson Fowler, F.S.A., of Durham, was the architect, and Mr. H. Hurreood, of Mansfield, near Darlington, the contractor. Mr. Johnstone Stephenson, of Richmond, was intrusted with the painting and decorating. The restoration work was commenced last autumn. The old relics of the early part of the fourteenth century which have been discovered in the excavations have been worked into the building. The new southern window adds to the light. The pews and wood-work of the interior of the church are new, and are doted with the wood of the old pews. The roof supports are of stained oak, and the seats are of red deal.

Correspondence.

To the Editor of THE BUILDER.

"THE INSTITUTE AND ARCHITECTURE."

SIR.—In my opinion, whatever raises the art of architecture will help to raise the profession. I use the term "art of architecture" as I should use the "art of plumbing," only architecture differs from this, both in degree and in kind.

It may save time if I give my definition of architecture, and I define it as *building properly*; and this propriety does not consist adequately in adjusting the materials to their aptitudes, nor their arrangement in a building for roughly answering its end, but the being made to do that so completely that the use of the building is disclosed by its outward appearance. Certain classes of buildings ought to produce such noble ideas and strong emotions as are in harmony with the uses of the structures.

Buildings may be divided into three classes.—commonplace, monumental, and mixed. The commonplace buildings comprise those that are solely devoted to the necessities, such as warehouses, eating-houses, drinking-shops, offices for ordinary needs, barns, stables, cattle-sheds, &c. Monumental buildings are those whose main object, beyond shelter and convenience, is to raise emotions, or to embody lofty or terrible thoughts; churches, public monuments, the tombs and cenotaphs of great men, Parliament houses, prisons, and the like, and those devoted to the Deity should raise the highest.

The mixed are palaces, mansions, houses, &c., as they contain portions for the mere necessities, and portions for the display of the nobler instincts and faculties of man.

The architect is a humble rival of Nature, for he at least creates the shells for groups of human beings, and endeavours to make his building as perfect and characteristic as her organisms. Architecture is, consequently the master art of vision, the other visual fine arts raise emotions alone, which the highest architecture does too, but at the same time the works of architecture, like those of Nature, answer other ends. Some of Nature's works, merely as objects of vision, scarcely raise an emotion; some raise emotions of delight and of sublimity; some those of repulsion and horror. But whatever emotion is raised, the organism perfectly answers its purpose.

The emotions raised by architecture are as vague as those raised by music, but may be heightened and made more definite by painting and sculpture. As, however, the works of painting and sculpture are not architecture, and are only super-added, they may be left out of the consideration.

The architect can settle the shape of his building, and of the chambers of which it is made up, but he ought to do so in accordance with their needs, both physical and æsthetic. He can, under limitations, use what length, breadth, and height he chooses, but he is strictly bound to the laws of statics in putting his materials together and into shape. He can mould, shape, or pierce the parts, and he can draw attention to those portions that have the heaviest duties to do, by accentuating them; and in the highest class of buildings he can admit or exclude light as he pleases. To qualify himself for an architect, he first has to learn the qualities and strength of materials, and the laws of statics, and to arrange the sub-divisions of his building properly and conveniently; but if he wants to raise the right emotions he has to consider how existing shapes affect him, to learn these laws that make arrangements of voids and solids agreeable, and to investigate the methods hitherto adopted of dividing and of accentuating parts, and the effect on himself of light, twilight, and darkness in buildings. You can, by examination, ascertain if the student has acquired this indispensable knowledge, and roughly learn these laws, and can apply them, up to any point you like. It is hardly to be imagined that anyone acquainted with architecture can maintain that this knowledge is not indispensable. The Institute has started an examination with a view of ascertaining if this knowledge he possessed, and has refused admittance to students who do not possess it, and from experience it has found that it has stimulated their industry and raised the standard of excellence. Though the present examination is far from being all that could be desired, and does leave the emotional, commonly called the æsthetic part, rather in the background. This examination deals, and has dealt, entirely with theory, and admits only to the Associateship, which was the lower grade. There is a large body of architects outside the Institute who have built, and who, if desirous of joining it, must now be admitted as Fellows under the provisions of the old Charter, which merely exacts that they shall be over twenty-nine years of age, and have practised for seven

years; and this holds good until the Royal Institute of British Architects insists on an examination, which it now has power to do.

The abstract consideration of what is most beneficial for the profession is purely intellectual, but the putting it into practice may not only excite the passions of Associates and Fellows, and of those proposing to become either, but may also tend to overthrow their preconceived notions. It may be well, therefore, to glance at the intellectual part first. Each of the three great divisions of the art—planning, construction, and æsthetics,—are capable of transcendental perfection. A great architect must have a certain transcendentalism in each of the three, which is the reason why great architects are the rarest of all great professional men.

I am inclined towards a more complete theoretical equipment as the qualification of Fellows, only then the qualification of age must be abandoned; men in practice cannot devote the requisite time to theoretical study, and all that age necessarily gives is experience.

If the restriction to twenty-nine years of age had been applied to military affairs, it would have excluded Alexander the Great during the greater part of his Persian campaign, and Napoleon during his conquest of Italy. Gallantry and skill in the field are, and always have been, looked on as entitling a man to promotion, whether he be theoretically educated or not. Our field is building, and I do not see why creditable buildings should not entitle a man to the Associateship, as well as theoretical knowledge; as he must have mastered a good deal of this to design and carry out his buildings. Low theoretical knowledge or creditable building would then qualify a man for the Associateship. There would be a body of young and accomplished theorists added to the present practising Fellows; and Associates, whether admitted for theoretical or practical knowledge, could be raised to the Fellowship, when their buildings were excellent enough; and, of course, there would be discretion left to admit eminent architects to the Fellowship at one step.

There must be some amendment of the Charter, and it appears to me that it might as well be made as comprehensive as possible.

GEORGE AITCHISON.

SIR,—The letters which you have recently published by Mr. Brydon and by Mr. Belcher, and your observations thereon of the 10th ult., are most valuable in drawing attention to some of the very weighty questions which have now to be thoroughly threshed out by the Council and by the members of the Institute when they take into consideration the subject of the qualification of Fellows.

That the Fellowship of the Institute should be conferred as a distinction and honour, not only for artistic merit in the candidate's work, but also for the constructive skill and practical knowledge shown in it, is what I feel certain was intended to be expressed by both these writers. In pleading for the special recognition of Architecture as a fine art, they are far from wishing to ignore the all-essential *other* side of the question, and, as I read their letters,—they strongly deprecate the cutting up into separate items all that is involved in true Architecture.

What we cannot but feel is that a tendency has developed itself in the Institute to neglect as an essential qualification for a Fellowship the artistic side of the profession of architecture. And for this reason some of us are in agreement with the "memorialists" in resenting this, although we on our part are unable to accept what seems, in fact, to be their view, that the profession of Architecture, with all the practical knowledge it ought to involve, is of necessity antagonistic to art.

Is this a view which Cockerell, Street, Digby-Wyatt, Scott, Burgess, or Donaldson would have accepted? Were not they as artists and professional men representatives of the different phases of the architecture of the nineteenth century, of whom the world of art may well be proud? And they were Fellows of the Institute and worked hard in its behalf.

When such names are recalled to mind, one cannot but be struck with the tone of some of the Presidential addresses and annual reports of the Council congratulating members on the yearly increase of our numbers,—implying "quantity" rather than "quality." This is the interpretation which those standing aloof from us may fairly enough put upon the con-

gratulatory words, and we cannot blame them if they do so, and if their lack of sympathy with the Institute is thereby increased.

With all deference, one may, perhaps, suggest that to hear of, or to read of, the names of men known and honoured for their good work in architecture,—in the truest and highest sense of the word,—on their election as Fellows, would give one a greater idea of the dignity of the Institute than to learn that such-and-such a number had been added to its rolls,—not a few of them, we cannot but know, having been elected by qualifications other than architecture. Numbers, doubtless, improve a balance-sheet! but, if financial considerations are of importance, or very considerable expenses under the head of literature might be reduced with advantage to the members. We do not pretend to be a "publishing" nor, in a literary sense, a "learned society." This latter term ought, however, to apply to us if a cultivated taste and skill in constructive architecture were to be the mark of a Fellow of the Institute.

Such qualifications are independent of style or fashion, as the names of those late Fellows referred to prove. Although a prevailing fashion may for a time have undue weight in elections, yet, if a man possesses these qualifications, sooner or later their influence will tell, and bear down all opposition. If, however, he does not possess them, surely he ought not to be elected a Fellow of the Institute of British Architects?

R. HERBERT CARPENTER.

P.S.—Since writing the above, I have read with great interest the further letters you publish and the notes thereon. I most heartily endorse all that Mr. Ernest George writes, feeling that it is, as a general rule, only by study—which examinations encourage,—that men will in their after life be in a position to act and think for themselves, instead of blindly and often ignorantly following in the wake of those leaders whose position has been acquired by hard work, by reading, travelling, and drawing, without which "genius" is sure to "run wild," and waste itself in eccentricities.

SIR,—Mr. Jackson has forgotten his Vitruvius. This author, who must be accepted as a better authority for the use of the name "architect" than our new-fangled school, distinctly specifies as part of the duties of an architect the decision of questions of "light and air," no less important in Imperial Rome than in London. What a farce this modern "preciousness" is! The Institute has sometimes been accused of being a trades-union; the few restrictions they impose are as nothing to the iron bonds proposed by the "memorialists." One may evidently assume, without offence, that the little knot of young architects so indiscreetly belated by Messrs. Brydon and Jackson are for the most part ignorant of questions of practice that have certainly hitherto been considered as pertaining to the duties of an architect, and that they are endeavouring to cloak that ignorance by casting discredit on the performance of such duties. Surely a sounder position would be that which many of us are content to adopt, namely, to admit that, owing to the altered conditions of modern life, it is impossible or difficult for one man to combine all the branches of the profession.

I, for one, refuse to accept this fanciful limitation of an ancient title, and uphold that the only test of an architect is his capacity to practise architecture in its widest sense. I maintain my own right to do anything to earn an honest living, subject to the slight restrictions I submit myself to as a member of the Institute, and I decline altogether the trades union tyranny that the memorialists seek to impose on us.

I decline to admit any forfeiture of my rank as an artist, even if I should sell a property, write a book, or fill a diocesan surveyorship, as I believe Mr. Jackson formerly did.

RALPH NEVILLE, F.S.A.

THE PALACE OF XERXES.

SIR,—I have only just returned to England, and seen in the issue of September 3 your review of the translation of Messrs. Perrot and Chipiez work on the "History of Art in Persia." On p. 180 you refer to the argument which the authors of that work have put forward against Fergusson's restoration of the plan of the palace of Xerxes, viz., that drains are shown on Flandin and Coste's plan under the line of walls suggested by Fergusson,—a strange oversight on the part of the architect

to undermine his own work," and you conclude by saying, "if this plan [viz., Flandin and Coste's] is correct, the criticism is a sound one." I have always regarded Fergusson's restorations of the plan of this palace and other structures at Persepolis as much more reasonable than those of the French authors; at the same time it would have constituted a weak point in his contention if, as a matter of fact, the drains were correctly shown on the plan referred to. Before Mr. Weld Blundell started on his travels last year to Persepolis to obtain a collection of casts of Persian sculpture for the British Museum (where that phase of art is almost entirely unrepresented), I directed his special attention to this point, and prepared for him a plan from Flandin and Coste's work, indicating the line of drains which they had shown. From the careful examination which Mr. Blundell made it would seem that Messrs. Flandin and Coste had assumed that the line of the drains ran between and connected together the various vertical shafts provided to carry off the rain-water. This assumption turns out to be incorrect, for although in two or three cases two of the vertical shafts are connected together where there were doorways between, as a rule, these vertical shafts are connected by horizontal pipes leading to the main drain, which lies equi-distant between Fergusson's proposed wall and the first row of internal columns. These vertical shafts, about 15 in. to 20 in. in horizontal section, were cut in large blocks of stone accurately fitted together, and were probably carried up in the thickness of the wall to take the rain-water from the roof. Messrs. Flandin & Coste would seem to have assumed that they were intended to take the surface water from the platform, but I am informed by Mr. Blundell that in some cases where they have been preserved they rise already some 12 in. to 15 in. above it, showing that they must have been embedded in some wall, and it is singular that this should not have been noticed by Messrs. Flandin & Coste. Mr. Blundell was able to trace the existence of walls at the angles of the platform between the great porticoes, and the theory which has been put forward against the existence of walls in other positions, because no traces of their foundations can be found on the present consolidated surfaces, Mr. Blundell upsets by pointing out that this consolidation has been effected by time since the destruction of the buildings, and that when they are cut through there is ample evidence of substructures of various kinds.

R. PHENE STRYKER.

* * * We may observe that we pointed out specially, in the article referred to, that the argument from the supposed line of drains was only a second-hand one as far as MM. Perrot and Chipiez are concerned, and we are not surprised to find further investigation throwing doubt upon it.

VESTRIES AND HOUSE DRAINAGE.

SIR,—Your correspondent Mr. Fend appears to be under a misapprehension as to the powers of the Metropolitan Vestries, which he greatly over-estimates.

The Metropolitan Vestries and Boards of Works have no power to make any by-laws or regulations respecting house drainage; this power being vested by the Metropolitan Local Management Act, 1855, sec. 202, and Public Health Act, 1891, sec. 39 (1), entirely in the London County Council, and, as a matter of fact, neither the Metropolitan Board of Works nor the London County Council have ever made any such by-laws. The only by-laws the Vestries are empowered to make are for regulating the business of their meetings and the appointment and remuneration of their officers (Metropolitan Local Management Act, 1855, sec. 202), and for water supply and the removal of certain nuisances (Public Health Act, 1891, secs. 16 and 39), and these by-laws, if they involve a penalty, have to be approved by the Home Secretary; the Local Government Board have only to deal with the local by-laws of the provincial boards.

I am well aware that some of the Vestries do issue what purports to be by-laws or regulations, but these as such are totally illegal, and can only be enforced by "honne"; and as many of the "regulations" are obsolete, and even in the highest degree objectionable, this cannot be too well known. The law never contemplated allowing the Vestries to force upon builders and architects (most of whom are better versed in such matters than the Vestries) any particular system or want of system of drainage; but it gives the Vestries power to see that the provision of the Acts are carried out, that every house shall be provided with proper drainage and water supply; it certainly never contemplated that set regulations should be followed to the exclusion of all possibility of improvement.

Before commencing any drainage works, any person must, by the 1855 Act, sec. 36, give to the Vestry seven days' notice in writing of his intention, and the Vestry must then, within seven days (unless the time be extended to not more than fifteen days by the Surveyor, under the 1862 Act, sec. 43) make their order of requirements to be served on the person giving notice. This the Vestries usually do by serving a general printed notice, with the so-called "By-laws" or "Regulations" printed on the back. This, I contend, is not good service of the order or notice, as by the Public Health Act, 1891, it is enacted, sec. 127, (1) Notices, orders, and other such documents under this Act shall be in writing; and notices and documents, other than orders, when issued by the County Council or a Sanitary Authority, shall be sufficiently authenticated if signed by their clerk or by the officer by whom the same are given or served. (2) Orders shall be under the seal of the Council or Authority, duly authenticated.

This clearly shows that it is intended that all orders on the requirements of drainage shall be made on the merits of the individual case, and not on a general printed form of regulations, but must be in writing and under seal.

Again, the Vestries are not the final authority, as by the 1855 Act, sec. 211, appeal is allowed to the London County Council, and this is confirmed by the 1891 Act, sec. 126; and I venture to think that the County Council would over-rule the absurd orders of some Vestries, such as "regulation" (1), for instance, as the prohibition of the use of iron pipes by the Camberwell Vestry.

I consider the only way to obtain proper sanitation would be for the County Council to take the matter in hand, and, with the assistance of the eminent sanitary men of the day, frame a set of by-laws that shall, while ensuring sound efficient drainage, give perfect freedom to the architect as to the system to be adopted, and give ample room for the adoption of all possible improvements.

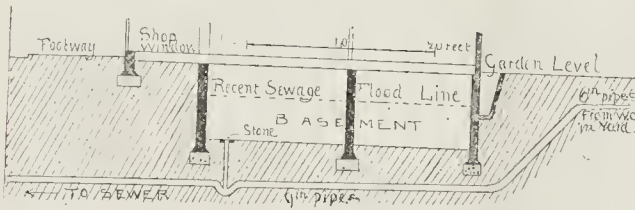
It is, I think, an anomaly that while all building operations are under the jurisdiction of the District Surveyor, the drainage of houses is under the Vestry and their Surveyor; so that vestrymen who may, and generally do, know nothing of sanitation have the power to dictate to an architect, and put him to much trouble and annoyance before he is allowed to do his work properly.

In conclusion, I wish to draw attention to the fact that the Public Health Act, 1891, enacts in sec. 39 (1) that "the County Council shall make by-laws with respect to water-closets, &c.—not "may," but "shall." What, then, becomes of the Vestry "regulations" and "by-laws"?

BERNARD DICKSEE.

DISTRICT SURVEYOR'S DRAINAGE.

SIR.—Owing to the heavy fall of rain recently the main sewer in the district from which I write became choked, and the basement of a dwelling-house and shop flooded with sewerage to about 5 ft. above floor level; the drain under had burst. To obviate this in the future I was called in to lower the drain under the basement 3 ft., to make joints with Portland cement and sand, and to surround the pipes (ordinary glazed) with 6 in. of cement concrete, the Vestry lowering the drain on the outside to the main sewer. The owner was served with a twenty-four hours' notice to insert a syphon-trap within the main front (there is one-story shop-front extending 8 ft. in front of the main building). I spoke of the difficulty of clearing



these syphons in case of stoppage, so was ordered to put a vertical pipe-shaft leading up to the basement floor, with a stone covering, to easily enable a rod or plunger to be inserted in case of need.

I wish to ask your opinion, or that of your readers, upon the questionable wisdom of the authorities in insisting upon placing the syphon, with its connexion, in this position.

It appears to me, so far as flooding, the shaft is exactly undoing that good that is effected by lowering the drain, as the sewerage will have less obstruction (only a 3-in. stone) than formerly, to say nothing of the possibility of sewer-gas penetrating directly into the dwelling.

The owner, at my suggestion, expostulated, and offered to place the syphon anywhere outside the building, but in vain.

I thought this might be interesting, as one very good way to introduce cholera bacillus and numerous other infections.

NOTANDA.

The Student's Column.

CONCRETE.—XIV.
SAND.

WE have, at some length, considered the various limes and cements which are used in concrete. The remaining ingredients now call for notice, and at the outset we must say that the disintegration and rottenness of concrete is often due, not to the lime or cement, but to the aggregate. An instance in point is recorded in *The Engineer* for May 30, 1890; about a thousand concrete blocks, which had been made for the Shillamill Viaduct on the Plymouth, Devonport, and S. W. Junction Railway, were perfectly useless, and at length it was discovered that the sand which formed part of the concrete contained much of a mineral washed down the stream from an arsenic mine, and this had totally destroyed the setting properties of the cement. Other instances could be quoted to show the importance of the aggregate.

The addition of sand to cement-paste has two effects: it weakens the mortar and retards the hardening of the cement, both in air and in water (see fig. 2, chap. xi). To pastes of fat and feebly-hydraulic limes, however, the addition of a certain amount of sand quickens the hardening of the mortar in air, and increases its ultimate strength, but this at the best is very little. The more hydraulic the lime or cement is, the less is the advantage of adding sand except for the sake of economy. Neat cement is stronger in every way than any mixture of cement and sand. Table ii., chap. iii., shows the diminution in tensile strength caused by mixing increasing quantities of sand with various limes and cements.

"Sand is, in general, a loose aggregation of water-worn particles, arising from the disintegration of pre-existing rocks or other mineral matter. It is generally composed of the hardest of simple minerals, and longest resisting the processes of attrition; but it may also consist of the particles of shells, corals, &c., hence such terms as shell-sand, coral-sand, iron-sand, and the like. The minute particles thrown out by volcanoes, and produced by explosive force and attrition, are spoken of as volcanic sand."

It is said that calcareous sand yields somewhat better mortar than siliceous sand. Some sands of igneous origin confer hydraulic energy on pastes of fat lime. Igneous rocks are classified as *Granitic*, *Trappaceous* and *Volcanic*, the last being the name applied to those igneous rocks which are of recent formation. This *Volcanic* group is interesting to the architect and engineer, because it includes *puzzolana* (from *Pozzuoli*, near Naples), *trass* (from *Rhenish Germany*), and other substances of similar nature, which confer a quite considerable amount of hydraulic energy on pastes of fat lime. Such substances are now never used in England, but prior to the introduction of

bind a much larger quantity of granite sand than of any other sand.

Doubtless this statement rests on the fact that certain igneous earths do confer hydraulic energy on lime. Gillmore states that the sand of "certain granwacks, psammites, granites, schists, and basalts" confers a small amount of hydraulic energy, but that they are improved by calcination; they can, he adds, be used in a larger proportion than other sand for mortars, when time can be allowed for the sand to develop its hydraulic properties before the mortar is immersed. It will be noticed that Gillmore does not say that all granites, &c., have this property, but only certain of them. In many parts of Japan a decomposed granite sand is found, the coarse, gritty part of which has, according to Dr. Takayama, no beneficial effect whatever on lime. "China clay of good quality," and forming less than one-fourth of the total quantity of the sand, does confer hydraulic properties. "Some felspathic granites," says Dr. Page, "like those of Devon and Cornwall (Cornish stone), are easily decomposed when exposed to the weather, (or artificially ground down), and in this state produce a fine impalpable clay (silicate of alumina,—silica, 60; alumina, 40), known as *kaolin* or China clay, and largely employed in the manufacture of the finest pottery and porcelain." The yellowish powder in the Japanese sand just alluded to is evidently similar to the clay produced by the decomposition of these felspathic granites, and, bearing in mind the constituents of hydraulic limes and cements, we can quite understand that the addition of silicate of alumina in this impalpable form may confer upon limes more or less hydraulic energy. Indeed, a white cement, which has the same general characteristics as Portland cement, but with only about one-half its tensile strength, can be made by grinding together three parts of chalk and one of kaolin, burning at a red heat, and again grinding. The fine dust formed in crushing syenite has been found to have a weakening effect on mortars, just as other fine dust or mud has.

From this it will be seen that only certain kinds of igneous rocks, and these only when decomposed or ground to an impalpable powder, confer hydraulic properties upon lime, and not ordinary granite in the form of grains or larger pieces. We may assume that those granites which weather best as building-stones will confer the least benefit on limes and cements. Apart, however, from all questions of hydraulicity, granite-sand forms excellent concrete, the grains being irregular and durable.

The characteristics of good sand should be:—1, cleanliness; 2, coarseness; 3, angularity; 4, hardness; and 5, durability.

(1) *Cleanliness*.—Sand should be free from clay and organic matter, and, if the presence of these be suspected, the sand should be thoroughly washed, as they prevent, to some extent, the proper hardening of the cement. Mr. Grant, in 1862, found that, at all ages up to twelve months (and the experiments were not carried further), briquettes made with loamy pit-sand were considerably inferior to those made with clean pit-sand. At the age of one year the ratios of strength were as follows:—1 to 1 mortar, clean 100 to loamy 81; 1 to 2, clean 100 to loamy 87; 1 to 3, 100 to 84; 1 to 4, 100 to 77; and 1 to 5, 100 to 77. On the other hand, some experiments by Mr. E. C. Clarke, of Boston, with briquettes of cement and sand, the latter containing about 10 per cent. of loam, showed that "at one month the breaking loads were only about one-half what they would have been had clean sand been used, but at six months and one year little difference was observable." The knowledge that clean sand gives twice as good results at one month as loamy sand, is quite enough to preclude the use of the latter. Mr. Grant's experiments on briquettes one month old gave the following results:—1 to 1 mortar, 100 to 83; 1 to 2, 100 to 78; 1 to 3, 100 to 74; 1 to 4, 100 to 84; and 1 to 5, 100 to 64. Mr. Clarke also found that the presence of clay "in moderate amounts" does not weaken cement-mortars; but this is certainly contrary to the general belief.

Sand from roads, pits, and sluggish streams or ditches must be looked upon with suspicion, as it will in all probability contain fine mud, or clay, or organic matter; but sand from the beds of quickly-flowing streams may generally be accepted as clean enough, as the loam and clay will have been washed away by the stream. Sand from quarries is also good in this respect. Further, sand should not contain

* Dr. Page.

any mineral substance or colouring matter which would injure the strength or appearance of the concrete, such as iron, salt, coal-dust, &c.

The salt in sea-sand does not appear to have any appreciable effect on the strength of the mortar or concrete in which it is used, but it has a tendency to attract moisture and cause efflorescence on surfaces exposed to the atmosphere. Washing the sand in fresh water may lessen this tendency a little. Many concrete houses have, however, been built with material taken direct from the sea-beach without any ill-effects, provided that the exterior is skimmed with cement, either neat or mixed with clean pit or river sand.

(2) *Coarseness.*—This characteristic has more influence on the strength of mortar and concrete than architects usually think. Many experiments have proved that fine sand makes weaker mortar than coarse. The explanation of this probably lies in the fact that the smaller the grains are in a certain quantity of sand the greater is the superficies over which the cement-film has to be spread. For instance, in a cubic inch there are, roughly speaking, about 8,000 grains of sand one-twentieth of an inch in diameter, or about 27,000 grains one-thirtieth of an inch in diameter; the total superficies of the former grains will be $(.05 \times .05 \times 6 \times 8,000 =) 120$ sq. ins., and of the latter $(.03 \times .03 \times 6 \times 27,000 =) 176$ sq. ins. In other words, the grains in one-and-a-half measures of the coarser sand will have only about the same superficies as in one measure of the finer.

The following table gives the results of two series of tests carried out by Mr. Grant in 1878-9. The cement was sifted through a sieve with 2,580 meshes to the square inch, and was made into briquettes with three parts of sand (by weight); all the briquettes were kept in water. Each figure is the average of ten tests, the result being given in lbs. per square inch.

TABLE XVIII.

Tensile Tests of Portland Cement and Sand—(Coarse and Fine).

No.	Sand tested by sieves.	At 28 days.						
		Nos.	lbs.	lbs.	lbs.	lbs.	lbs.	
1	First Series—							
	1 cement to 3 sand	20-30	78.5	113.9	116.9	142.3	178	205.5
2	ditto	10-20	137.1	239.5	223	231.5	254.5	251.5
	Second Series—							
3	1 cement to 3 sand	20-30	117.2	134.5	145	156	157.8	213
	ditto	10-20	212	236.5	206	253	267.5	273.5

The sand used in the tests numbered 1 and 3 had all passed a No. 20 sieve (400 meshes to the square inch), and had all been retained by a No. 30 sieve (900 meshes in the square inch); for the tests numbered 2 and 4, the sand had passed a No. 10 sieve (100 meshes to the square inch), and had been retained on a No. 20 sieve. The superiority of the briquettes made with the coarser sand is very evident, but it is also evident that the superiority is greatest at the earlier dates. After about two months the strength of the briquettes made with the finer sand gradually approaches that of the coarse-sand briquettes. Thus, the latter are 77 per cent. stronger than the fine-sand briquettes at the age of one month, and 91 per cent. at two months, but they are only 63 per cent. stronger at three months, 62 at six months, 55 at nine months, and 25 at twelve months. It would be interesting to know by experiment whether the more rapid increase of strength by the fine-sand briquettes is maintained until the two mortars are of equal strength. The probability is that such is not the case, but that the finer mortar is permanently weaker. But whether this be so or not, the coarser sand ought to be used, for, other things being equal, that mortar or concrete which will attain a certain strength in the shortest time is the most suitable. Architects and building-owners cannot afford to wait an indefinite period for concrete to harden; the centres of a concrete floor will probably be struck in a month or less, and if at that time concrete made with coarse sand is 77 per cent. stronger than that made with fine sand, there can be no doubt as to which ought to be used. Sand containing both coarse and fine grains is better than all fine, and, indeed, is not much inferior to coarse. When only fine sand is available, as little as possible should be used in the concrete if strength be required; but if a concrete imper-

vicious to water be needed, then sand and fine gravel enough must be used to fill completely the interstices of the aggregate. The fine sand which is blown about by the wind and formed into sandhills makes bad mortar and concrete; and the fine powder which is produced by stone-crushing machines ought to be washed from the sand and broken stone before these are used.

We have received from Mr. Henry Fajla, M.Inst.C.E., the well-known authority on Portland cement, a leaflet containing a description of his method of testing cement, and a specification of Portland cement. The latter requires all the cement to pass a No. 25 sieve, and 90 per cent. of it to pass a No. 50,—pats placed in his heated apparatus for twenty-four hours must show no signs of expansion or contraction, and neat briquettes must bear at least 250 lbs. per square inch at three days, and 350 at seven days.

OBITUARY.

M. EDMOND DE JOLY.—We regret to hear of the sudden death on Monday last, at Neuilly-sur-Seine, of one of the best-known French architects of the day, M. Edmond de Joly, architect of the Chambres des Deputés and of the Salle des Séances du Congrès National at the Palace of Versailles. M. de Joly was a former member of the Conseil Général des Bâtimens Civils, and a former Vice-President of the Société Centrale des Architectes Français, and honorary member of the architectural societies of Lyons and Lille, an officer of the Legion of Honour, &c. He was born in Paris in 1824, and was a son of Jules Jean Baptiste de Joly who, from 1821 to 1855, was architect of a number of State buildings, and particularly of the Palais Bourbon, including the Chambre des Deputés and its dependencies, as well as the Hôtel de la Présidence (formerly the Hôtel de Lassay). Edmond de Joly was at first associated in work with his father, to

whom he became "inspecteur" and whom he succeeded in 1865 as architect to the Palais Bourbon, and looked after the lighting and heating and other interior arrangements of the Chambre des Deputés and the Presidency, as well as the re-arrangement and decoration of the Salle des Séances; he also, in 1871, installed the National Assembly and (later) the National Congress, in the theatre of the Palace at Versailles. Latterly he had prepared a remarkable plan for the reconstruction of the actual Salle des Séances and Chambre des Deputés, to which reference has before been made in our columns, and which was on the eve of being submitted to Parliament. In addition to his official and private work as an architect, M. de Joly devoted a good deal of his time to questions of professional interest, and was a member of various committees in connection with the Société Centrale. Mr. W. SUGDEN.—We regret to hear of the death, at the age of 71, of Mr. W. Sugden, the senior partner in the well-known firm of W. Sugden & Son, architects, of Leek. The news only reached us shortly before going to press. We may be able to give some information about the deceased architect in our next. Buildings by "W. Sugden & Son" have been frequently illustrated in our pages, as our readers will remember. The last we illustrated was a large house—"Woodcroft," in the *Builder* for December 12, 1891.

Mr. JOSIAH DIMMOCK.—This gentleman, who for about a quarter of a century had lived at Fradswell Hall, near Stafford, died on the 23rd ult., at his residence. Mr. Dimmock was for many years head of the firm of J. & T. Dimmock & Co., English and foreign timber merchants, Stoke-on-Trent and Stone. He was a member of the Staffordshire County Council.

INTERNATIONAL BUILDING EXHIBITION IN LEMBERG.—An international building exhibition is now being held at Lemberg, in Galicia. It is under the patronage of the Governor of Galicia, and embraces all materials connected with the building industry. A jury will distribute the medals offered by the Austro-Hungarian Governments.

GENERAL BUILDING NEWS.

READING UNIVERSITY EXTENSION COLLEGE.—The Corporation of the Borough of Reading some few years ago purchased a very dilapidated property known as the Hospitium, once belonging to Reading Abbey, with the object of securing its preservation. The building originally was erected in the twelfth century, and formed a part of the Hospital of St. John the Baptist, erected 1192, by Abbot Hugh. Nothing, however, remains of that date except some portions of the foundations, upon which the present building appears to have been erected in the reign of Henry VI., in the middle of the fifteenth century, as the Hospitium for the accommodation of poor travellers. In 1435, one portion of the Hospital was converted by Henry VII. into the Royal Grammar School, but the part now remaining continued to be used for the reception of travellers up to the time of the dissolution of the Abbey; it was afterward converted into a stable, and used as such by Queen Elizabeth. In 1660, it passed from the Crown into private hands, and was converted into tenements. It has now been restored and converted into the "Reading University Extension College," at the cost of the Corporation, and has just been opened, the Dean of Christchurch, Oxford, and Sir Cunliffe Owen being amongst those taking part in the ceremony of inauguration. The restoration of the old building and its conversion for college purposes has been carried out under the directions of Mr. Slingsby Stallwood, of Reading, who is Chairman of the Survey Committee of the Corporation, and has acted as honorary architect. The work was executed without a contractor, under the management and supervision of the Borough Engineer, and the cost has been about 3000l.

METHODIST CHAPEL, NEWTON HEATH, LANCASHIRE.—On the 17th ult. a new Methodist New Connexion Chapel was opened in Ten Acres-lane, Newton Heath. The building stands at the corner of Robert-street, on land which was formerly the site of the old school. There are two front entrances, both opening into a vestibule. The one on the right has a staircase leading to the children's gallery, which is placed over the front part of the chapel. There is also a gallery at the rear for the organ and choir. A side entrance from Robert-street communicates with a vestry for the minister, and a church parlour for use of members and congregation. The style is Gothic, and the building consists of grey bricks relieved by red bands, and quoins and terra-cotta string-courses and labels, the main features being the gable at the front with large tracery window filled in with stained glass, and the tower and spire at the corner of Robert-street, carried up to a height of 60 ft. The roof is open-timbered, with hammer-beam principals, eaved at a height of 28 ft. from the floor. The seats are open benches, and accommodation is provided for 500 persons. The whole of the inside woodwork is executed in pitch pine and varnished. The cost, which includes lighting, heating, ventilation, boundary-walls, gates, and railing, is about 2,000l. The contractors for the work were Messrs. F. & E. Haynes, builders, Moss Side, and the architect was Mr. J. W. Firth, of Oldham.

ALTERATIONS TO BANK PREMISES, HEREFORD.—

The Hereford branch of the National Provincial Bank of England has just undergone various alterations. The heavy counter has been removed, and also the old-fashioned boxes in the centre of the large hall, the old furniture being replaced throughout with mahogany fittings. New lavatory arrangements have been carried out in the basement. The work has been executed under the direction of the architect, Mr. Charles R. Gribble, of London, and Mr. Grimes has been clerk of the works. Messrs. W. P. Lewis & Co., of Hereford, were entrusted with the contract.

CHURCH SCHOOLS, SALFORD.—

On the 17th ult., the new schools situated in Blackfriars-street, Salford, which have been erected to replace the old Sacred Trinity Schools, the site of which has been acquired by the Lancashire and Yorkshire Railway Company for purposes of extension, were formally opened. The building, which fronts Blackfriars-street, adjoins the club baths and racquet courts, and extends back towards the south-west as far as John-street. It is of four stories. The ground floor is kept well up above the street level in order to admit of a well-lighted basement, in which are covered playgrounds, one for the girls and infants and another for the boys, both being fitted up with gymnastic apparatus. There are also in the basement a kitchen, a boiler-room for the heating apparatus, a fuel store, and the lower stage of the hoist. The ground floor is reserved for infants, who have a large school-room, 30 ft. by 32 ft., and another room, 32 ft. by 18 ft. for the youngest of all. On the second floor, which is for the girls, there is a school-room, 54 ft. by 32 ft., with arrangements for partitioning off two class-rooms at one end by means of coiling shutters. On the boys' floor—the top room—a similar arrangement prevails. Out of school, the boys and girls have separate playgrounds. Though worked as a mixed school there are separate staircases, playgrounds, cloak-rooms, and latrines. There are open fireplaces in three class-rooms, but the heating is chiefly effected by hot-water pipes and radiators in all school-rooms and class-rooms. The contract

(for about 5,000l.), which includes the heating and ventilating apparatus, gas fittings, grates, and hoist, was taken by Mr. James Hamilton, builder, and Altrincham, who has carried out the works under the direction of Mr. Woodland Taylor, of Manchester, the architect to the trustees.

MASONIC LODGE, KILWINNING, Ayrshire.—The memorial-stone of the new hall in course of erection for the brethren of the Mother Lodge, Kilwinning, was laid on the 17th ult. The site of the new lodge has a frontage to Main-street. The style adopted is that of the Scottish Renaissance. An arched doorway, forming the main entrance, occupies one side of the frontage, and in the centre is a double window, lighting the main committee-room. Over the ground floor moulded trusses carry a stone balcony and balustrade, which run along the whole frontage, and also carry a projecting five-light oriel. Above this is a steep-pitched gable with moulded copings. The front is of red sandstone from Montgomery Quarry, and the roofs will be covered with pale green slate, finished with red-tile ridges. From the porch a tiled vestibule leads to the inner staircase hall, from which the lodge-room is entered, and a wide square staircase gives access to the upper floor. The lodge-room will measure 42 ft. by 25 ft. On the ground floor there will be a committee-room and other accommodation. On the upper floor are waiting-rooms. The building is being erected from the design of Mr. John B. Wilson, of Glasgow, under the superintendence of Mr. John Armour, jun., Irvine, as resident architect. The following are the contractors, viz.:—Masons, Messrs. MacLachlan & Sons; Wright, Mr. Thomas Armour; Plumber, Mr. Thomas Hall; Slaters, Messrs. Kerr & Son; and plasterer, Mr. David Stobie—all of Irvine.

PROPOSED NEW FREE CHURCH, MORNINGSIDES, NEAR EDINBURGH.—On the 15th ult., at the Edinburgh Dean of Guild Court, a warrant was granted to the trustees of Morningside Free Church to erect a new church and offices in place of the existing building. The church, which is to be a parallelogram in shape, will measure 93 ft. by 50 ft. internally, with a height of about 40 ft. to the ceiling. Round three sides of the interior will run shallow galleries,—up each side they are only one seat deep, with passage behind—the lighting being acquired from windows behind the galleries. In the centre of the front elevation will be the entrance vestibule, flanked on either side by staircases leading to the galleries above, and beyond these staircases, on each side, there will be on the ground floor retiring-rooms for ladies and gentlemen, and above them Bible class rooms. At the eastern end of the church the pulpit platform area will be recessed slightly, and accommodation provided for an organ. Behind the main building will be a hall, children's class-room, vestry, session-room, and caretaker's house. The church will afford accommodation for upwards of 800 sitters, while the hall will be seated for 200 to 250. A campanile tower will be carried up to a height of about 180 ft. The cost of the buildings is expected to be about 8,000l., excluding the upper part of the campanile tower, with which, it is understood, it is not proposed to proceed at present. The architect is Mr. Hippolyte J. Blanc, Edinburgh.

MINERS' HALL AND OFFICES, BURSLEM.—On the 26th ult., stone was laid of the new hall and offices for the North Staffordshire Miners' Federation, in Moorland-street, Burslem. The building, which is situate in Moorland-road, adjoining the proposed park, will be a red-brick structure, and will comprise a residence for the miners' agent, offices, committee-rooms, and a large assembly-room. The assembly-room is 31 ft. by 21 ft., and is on the first floor over the office and committee-rooms. The committee-room is 22 ft. by 15 ft. It is estimated that the building will cost about 1,500l. The plans have been prepared by Mr. G. L. Jones, architect, of Burslem, and the contract of Mr. W. Cooke, of Burslem, has been accepted.

THE RESTORATION OF KIRKSTALL ABBEY.—According to the Leeds Mercury, the work undertaken by the Leeds Corporation with a view of preserving Kirkstall Abbey is being steadily carried out. At the outset a thorough inspection was made. It was found that many portions were in an extremely unsafe condition. The services of Mr. Micklethwait, F.S.A., of London, were secured, and the work of strengthening the walls was commenced in May, 1891. Mr. J. T. Irvine was appointed clerk of works. Attention was first given to a very dangerous state. To erect new walls or pillars, or to replace the vaulting, was not the object which either the Corporation Property Committee or the architect had in view. While desirous of strengthening, they were strongly opposed to depriving the ruins of any of their historic interest. The instructions given to the masons were not to use a single new stone if they could possibly avoid it, but to utilize all the old material lying about the structure. The grouting of the south aisle and the adjoining walls has been thoroughly restored. All the defective joints have been filled up with concrete, and in that way strengthened. The north aisle, the condition of which was not quite so bad as that of the aisle opposite, has been treated

in a similar way. It was noticed that the caps of the north aisle were white, as if they were comparatively new. The explanation was that the surface of the stone was gradually chipping off. The architect advised the closing of the window on the western door, through which the wind had been blowing on to the caps. This was done, and the effect has already been noticed; the caps are beginning to assume the same shade as the rest of the stonework. A large amount of rubbish has been removed from the north transept, and beautiful features of the fabric have thus been brought to light. Amongst the rubbish were found many fine pieces of masonry, some of them in a remarkably good state of preservation. One capital discovered appears quite modern, the outline being almost as sharp as it would be of a portion of the north aisle was demolished by the fall of a portion of the tower. To strengthen the part of the wall standing, and to increase the stability of the walls of the north transept, two pillars are now being erected. The walls of the north transept have also been tied with wood, and chancel is perhaps the most difficult part of the work to be accomplished. Stones have dropped from the vaulting, and some of the joints in the walls are more or less defective. The plastering of the dangerous portions is a somewhat risky operation, and will require nothing but skill and care before it is completed. The adjoining walls appear to be in good condition. During the frost of last winter a part of the west wall of the cloister fell. This has now been rebuilt with the old stone. With a view of preserving the east vaults, a layer of asphalt has been placed over them. One of the supports of the ancient staircase leading from the cloister to the dormitory was removed last spring. This has been replaced and strengthened in which new material is almost the only instance in which new material has been used. Nothing, as yet, has been done to the east end of the chapter-house, but it is probable that the top will be strengthened with asphalt.

WESLEYAN CHAPEL, TAUNTON.—On the 22nd ult., the foundation-stones of a new Wesleyan Chapel, which is to be erected at Rowhaston, were of Barnstaple, is the architect, and the contractor is Mr. F. W. Rowsell, of Taunton. The building will be in red brick and Bath stone, and will hold about 300 when finished.

SANITARY AND ENGINEERING NEWS.

WEYBRIDGE AND OATLANDS SEWERAGE.—A Local Government Board inquiry was held on September 20 and 21, at Weybridge, by Colonel Chesney Rural Sanitary Authority for sanction to borrow 40,000l. for sewerage and sewage disposal. Mr. Avery, Q.C., instructed by Mr. Paine, solicitor, conducted the case for the Authority. It was explained that the proposed scheme would provide for the parish of Weybridge and the Special Drainage District of Oatlands, and as these districts are intakes, the scheme was unusually expensive through the precautions taken to prevent any stop the pollution which now takes place through the absence of sewerage arrangements. Mr. W. H. Radford, C.E., as Engineer to the scheme, gave evidence that it was proposed to collect all the sewage of the two districts at a central pumping station near the Thames, from which it would be pumped a distance of 3 miles to a disposal site near Byfleet. The disposal site would be 600 yards from the Wey, and 5½ miles above the nearest water company's intake. He explained the various arrangements for securing the best effluent obtainable, and for preventing any possible damage to the London water supplies. The sewage would be treated by chemical precipitation, followed by filtration through 28 acres of land, and the sewage mud would be pressed by machinery. He was convinced the scheme would prevent a great deal of river pollution, and would improve the quality of the water. The sewage disposal arrangements were of modern type, and exceptional precautions would be taken to prevent leakage from the sewers or overflow at the pumping station. No part of the works would be connected in any way with the river. The Hon. Francis Egerton, Chairman of the Sanitary Authority; Mr. H. Yool, J.P.; Dr. Sargent, Medical Officer of Health for the Surrey County Council; Dr. Jacob, Medical Officer of Health for the scheme; and others, gave evidence in support of, and the advantages of, the proposed arrangements, and disposal site. Several of the water companies were represented by counsel, solicitors, and engineers, but they gave no evidence against the scheme, though an adjournment was asked for on the first day to enable them to take further expert advice on the scheme, but the Inspector ruled an adjournment to the second day would be sufficient for this purpose, as the usual notices had been posted. Colonel Engledeu and other owners and

residents from the neighbouring village of Byfleet, opposed the scheme on the ground that the sewage disposal site was within from a quarter to three quarters of a mile of certain houses at Byfleet, and the works might result in depreciating the value of surrounding property. Local evidence was given in support of this position. The Inspector will report to the Local Government Board.

SEWERAGE WORKS AT BYFLEET.—According to the Western Morning News, the drainage works at present in progress in the streets of Plymouth are causing great inconvenience to traffic. For many months various parts of the town will be in a state of upheaval, whilst the new intercepting sewers are being laid at a cost of nearly 60,000l. The tender of Mr. G. Shillaber for carrying out the first section of the scheme has just been accepted. The undertaking is to cost over 20,000l. Sewers will be laid from Millbay Pier, near the outfall, to Deadlake, traversing the Dock Wharf, the G.W.R. Mileage Yard, Phoenix-street, Manor-street, and Quarry-street. From this last point there will be a tunnel to the Deadlake. In other quarters of the town similar excavations have been in progress for some time, though these works have in connexion with the large scheme referred to. In Union-street new sewers are being laid, tram-line removed, and wood paving substituted for the roadway surface. Mr. C. L. Duke is the contractor.

NEW WATERWORKS FOR NELSON, LANCASHIRE.—On the 21st ult., water was for the first time allowed to enter the new compensation reservoir constructed at the foot of Pendle Hill, about a mile distant from Nelson. New filter-beds, constructed in the Ogden Valley, about a mile distant from the new reservoir, were also opened. The beds and the reservoir have been designed by Mr. John Newton, engineer, Manchester, and have been constructed by Messrs. Herbert, Park, & Co., of Manchester. The reservoir, which has a capacity for 40,000,000 gallons, was formally commenced about sixteen months ago. It impounds the Black Moss stream, and is the first of a series of reservoirs to be constructed by the Corporation of Nelson under the authority of an Act of Parliament obtained four years ago. The filter-beds are two in number, and are constructed in the Ogden Valley at 900 ft. above the sea-level. They have each a capacity of 700,000 gallons, and by a 10-in. main leading into them from the Ogden stream, 600,000 gallons can be admitted to the beds daily. The same quantity of water can be withdrawn from the beds daily and taken into direct use. In addition to this source of water-supply, the Corporation are possessed of two series of reservoirs with a combined accommodation for 8,000,000 gallons. The sanction of Parliament has also been obtained for the construction, when necessary, of two reservoirs, each to hold 40,000,000 gallons, on the Ogden stream, above the filter-beds, and another, to accommodate 180,000,000 gallons, at a lower level than the beds. As compensation for the appropriation of the Ogden stream, the Corporation will be required to construct, when the necessity arises, in addition to the existing compensation reservoir in Walverden (with a holding capacity of 25,000,000 gallons, and the new compensation reservoir into which water was admitted on the 21st ult.), another reservoir, to accommodate 8,000,000 gallons, near the one just constructed at Black Moss, at the foot of Pendle Hill. The cost of the reservoir just opened has been about 10,000l.

FOREIGN AND COLONIAL.

FRANCE.—A statue of the Republic, by the sculptor Ernest Mathé, has just been inaugurated on the Place de la Mairie de St. Omer, near Paris. —The French Government has just commissioned M. Carton to continue the excavations which he commenced last year at Duggu, in Tunisia, of the ruins of the Temple of Saturn. This monument was built in the reigns of Septimius Severus and Claudius Albinus, on the side of a hill which overlooks the valley of Foued-Khalid. It measures about 73 metres in length and about 28 metres in width. The cisterns under the Temple could not be cleared out for want of funds last year, but it is thought they contain interesting archaeological remains. —On September 22 the statue to the painter Millet was inaugurated at Cherbourg. The architectural part of this monument is the work of M. Gutelle, the city architect. —There have also been two other inaugurations, one at Vannes, of a monument to the novelist Lesage, sculptured by M. Emerand de la Rochette, and one at Rennes, of a statue of Lepordit, who was Mayor of that town in 1793, during the Terror. —In making some excavations in the courtyard of a school at Dis (Drone), the workmen have discovered two stone coffins, one at Vannes, and also some money of the time of Domitian. The town of Montargis is proposing to erect a statue to Louvet de Couvray, author of the celebrated novel of "Faulhas," who was sent to the Convention and sat amongst the Girondins. —It is announced the M. de Morgan has just been elected Director of the Ecole Polytechnique in place of M. Gréhaud. —There has been an inauguration lately at Béziers, on the plateau known as "Des Poëtes," of a monumental fountain, by M. Antoine

Injalbert, engineer, and architect, this artist has just authorised the erection of the statue of Dr. Biscoret, on the Boulevard de Port-Royal, before the door of the Hôpital du Midi. This statue, which is the work of the sculptor Ernest Barrias, was exhibited this spring at the Salon des Champs Elysées.

SWEDEN AND NORWAY.—According to the new building regulations of the City of Stockholm, no building is to be more than 13.5 metres in height, but a special exception has been made in the case of a structure for workmen's dwellings, building for the Stockholm Home of Workmen's Company, the height being fixed at 14.42 metres, there being four stories.—The Gothenburg Savings Bank has just taken possession of their new premises. The materials used are chiefly Swedish granite and sandstone, and the architect is Mr. Carlens. The work of restoring the ancient Royal Palace of Gripsholm, near Stockholm, towards which King Oscar has given considerable sums, is progressing well. The so-called State Chamber is now in hand, where the old original painted timber roof—of which a great deal was found in the palace—is being remounted. The woodwork along the chamber and the frieze with portraits of Gustavus Wasa and his contemporary rulers, are to be retained. The deep window recesses are being ornamented with decorative wall-paintings, stained-glass windows inserted, the Gothic mullioned replaced with one in Renaissance style, and the chandeliers and furniture exchanged for others in the style of the fifteenth century. The wall between the antechamber and saloon of the Dowager-Queen has been pulled down, thus forming a new large saloon.—The Swedish Parliament has voted a sum of 2,000*l.* and a loan of 2,500*l.* towards the restoration of the Cathedral of Skara. However, Prof. Hildebrand, the celebrated Crown Antiquarian, in a long letter to the press, states that the sum is insufficient, various architectural details having come to light whilst the work was in progress.

DENMARK.—The Corporation of Copenhagen has decided upon erecting a new Town-hall in the Danish capital, and commissioned Herr M. Nyrop, architect, to carry out the work, with a committee of supervision. The cost of the building is estimated at about 152,000*l.* In addition, 2,680*l.* are to be expended on sculptural decorations, 5,500*l.* on heating apparatus, and 2,350*l.* on frontage pavements, &c. The building will be constructed entirely of native material, and there will be a lofty clock-tower.—The Government intends next year to commence the erection of a large central post and telegraph office in the city of Nalburg, in Juland. Some years ago M. Aug. Duvier, a Frenchman, commenced the manufacture of glass mosaic with considerable success, and now the production of glass painting for churches, &c., has been commenced with equal success. This is the only factory of its kind in Denmark. M. Duvier has attached several well-known artists to his establishment, and important orders and offers of assistance from architects are coming in, including an order for the windows of the new Catholic church in Copenhagen.

MISCELLANEOUS.

UNIVERSITY COLLEGE LECTURES.—Professor Roger Smith will inaugurate the courses of lectures on Architecture at the University College, through the coming winter with a public lecture to be delivered at the College on Thursday evening, October 6, at 7.30, taking as his subject "Architecture: an Art, a Science, and a Profession." The usual evening classes on Architectural History and Construction and Modern Practice will commence the following week, and a new feature of the Government is the establishment of evening classes for both architectural and constructional drawing at such moderate fees as to bring them within reach of all students.

PROJECTED BRIDGE ACROSS THE BOSPHORUS.—In order to connect the railway systems of Europe and Asia a bridge across the Bosphorus would be absolutely necessary, and some time ago the Government has decided upon the construction of a railway across Asia Minor. Turkey, it seems, is anxious to establish a rapid connexion with India, China, and Japan, before the Transcaspian and Siberian Railways absorb all that traffic, and, in order to effect this, a permanent bridge or tunnel across the Strait must be constructed. The projects are three *viz.*, a submarine

tunnel, a tubular tunnel, or a bridge. The Sultan is said to be in favour of the latter, and at present the plans of Messrs. Giano & Covertier are under consideration. It is proposed to construct the bridge from the Serail Point in Stamboul to Essahieh-Isklessi in Scutari. It is to be a railway, carriage, and foot-bridge. The length, including viaducts for approach, would be 6,300 ft.

CREMATION ABROAD.—Cremation seems to be making great progress on the Continent. In Italy there are now crematoriums in twenty-two towns, which last year effected 286 cremations. In Milan alone six-hundred took place. This city has a travelling crematorium, which may be used miles from the town. The cost of each cremation is only 160 francs. In Germany there are four crematoriums, *viz.* in Heidelberg, in Offenbach-on-the-Main, in Oldslor by Hamburg, and Gotha, the latter being the oldest. In Berlin and other German towns crematoriums will also shortly be constructed.

THE (LATE) PATENT OFFICE MUSEUM.—The contents of this Museum, originally formed by the late Bennet Woodcroft, F.R.S., have been rearranged in the ground-floor of the gallery (Science side), Kensington Museum, through the National Portrait Collection was deposited for a while. The exhibits are rendered more attractive to the ordinary visitor by the setting in motion of some of the models, including Newcomen's atmospheric engine (1720); Watt's beam-engine, with a replica, in section, made under his patents of 1769-84, and used by him to work a lathe, with his earlier beam-engine (1781), with "sun and planet" gearing. The machines having closed cylinders—except, of course, the sectional model,—are worked by compressed air. Here are the rival "Rocket" and "Sauspareil" locomotives, which Stephenson and Timothy Hackworth, of Darlington, sent to the memorable competition, in 1825, on the Liverpool and Manchester railway; close by is M. Hedley's "Locomotive" (1813), the four-wheeled compound five-spur-wheels, which continued in use until June 6, 1862, at Wylam Collieries; Hislop's winding and pumping engine, patented in 1790, erected at Kell's Pit in 1795, and in work at Wreath Pit, Whitehaven, until the summer of 1878; and Watt's beam "sun and planet" engine erected 100 years ago at Atkinson's Chemical Works, Aldersgate street, and which worked there until 1855, when Mr. George Atkinson gave it to the department. This last has an arrangement for opening the valves which should be compared with the mechanism of the similar, but earlier, machine erected at the Soho works in 1788. In a separate case are two interesting relics, the original model, in brass, of Trevithick's locomotive of 1802, having no chimney, and heated by a cast-iron block put into a tube in the boiler; and a copy of Murdoch's locomotive, 1781-4, said to be the first of its kind, and believed to show the earliest adaptation of the slide-valve. The ill-fated *Great Eastern* is represented by a model of its 1,000-h.p. paddle-wheel engines, designed by Scott Russell, having four-oscillating cylinders, 74 in. in diameter, and a 11-ft. stroke.

THE JUNIOR ENGINEERING SOCIETY.—The presidency of the Junior Engineering Society for the ensuing twelfth session has been accepted by Dr. John Hopkins, D.Sc., F.R.S., in succession to Sir Edward J. Reed. The new session will be opened by the delivery of Dr. Hopkins's presidential address on Friday, November 4, at the Westminster Palace Hotel.

THE SOCIETY OF ENGINEERS.—By permission of the directors of the Great Eastern Railway Company, a number of the members of the Society of Engineers paid a visit on the 27th ult. to the locomotive and carriage-works at Stratford. The party, numbering upwards of sixty, were received by Mr. Holden, the superintendent, and conducted over the extensive works, which cover an area of fifty-two acres; the shops alone occupying thirteen acres.

THE DRAINING OF THE ZUYDER ZEE.—The great undertaking of draining the Zuyder Zee has advanced one step further, a Royal Commission of twenty-eight members having been appointed to consider the proposal. However, the plan is not a new one. It first cropped up in 1848, when the successful draining of the Hearen Zee brought State 18,000 hectares of fertile land, and in 1849 Herr van Diezelen, an engineer, submitted a plan to William III., according to which the Zuyder Zee was to be drained as far as the islands of Texel, Wieland, and Terschelling, whereby 550,000 hectares of land were to be gained. However, the Government rejected the project on account of its enormous cost. Similar proposals in 1866, 1870, 1875, and 1882 also straddled on the question of cost, but at present public opinion is so overwhelmingly in favour of the idea that it will no doubt be realised. The originators of the plan under consideration are Messrs. Vandentoor and Lily, engineers, the latter being also Minister of Commerce. According to this scheme, the Zuyder Zee is to be drained to the extent of 320,000 hectares, but a lobe, to be called the Vessel Zee, 150,000 hectares in area, is to be formed at the island of that name, for the preservation of the fishing. A powerful company has volunteered to carry out the Vandentoor-Lily plans in twenty-two years, the cost being estimated in round figures at the enormous sum of 19,000,000*l.* But, on the other hand, it should be remembered

that the draining of the Zuyder Zee would give to Holland a new province, larger than any one of her present ones. Numerous petitions are being presented to the States General, urging the taking in hand of the scheme immediately, and as one of its promoters is a cabinet minister, its realisation seems more probable, at all events, than before.

FORD'S SWINGING SASHES.—This is the last form of invention for a sliding sash window which can be opened so as to get at both sides of the glass from the room, and is a clever and ingenious one. The heels of the sashes on the left hand side of the frame are hinged on to moveable metal carriages sliding vertically in a slot in the window frame; on the right hand side the sashes are confined by flush bolts into a similar slot, and slide up and down with weights in the usual manner. On withdrawing the bolts, the sashes can both be opened (as casements) sufficiently to undo the right side sash-cords, which are attached so that they cannot possibly come undone when the sash is in its usual position, but can be immediately detached as soon as the sash has been swung sufficiently to get at the cords. When the latter are detached, the sashes can be swung wide open inside like casements, and the upper sash can be slid down also to the bottom of the window for cleaning. The window opening is then left entirely free, so that any large piece of furniture can be lifted through it when necessary. A concussion buffer is provided at the bottom of the weight-boxes, for the released weight to fall on. The disadvantages are a certain loss of light, as the outer sash is made smaller than the inner one in order to open clear of it on the hinges; and in large windows, as one of the weights has to be altogether detached for swinging the sash, a heavy sash would be left without sufficient counterbalance weight, and would require a little care in handling. In spite of these partial drawbacks, the invention is a clever and ingenious one, and worth the attention of architects.

EXHIBITION IN ANTWERP.—Antwerp intends to hold two exhibitions, *viz.*, a national one in 1894 and an international one in 1895.

THE ENGLISH IRON TRADE.—No amelioration is experienced in the English iron market. Nearly all descriptions of crude and finished material show signs of inactivity. Tin plates are very quiet, and a dull tone is observable in the majority of branches in the steel trade. Bessemer pig is again weaker. Shipbuilding prospects do not improve, and in engineering circles complaint is made of increasing slackness. The coal trade is a trifle sluggish.—*Iron.*

PLUMBING CLASSES, LINCOLN.—The Mayor of Lincoln was announced to preside over a public meeting to be held in the Town Hall, Lincoln, on Friday of this week, for the purpose of opening the plumbing classes held in connexion with the Lincoln School of Science and Art; the meeting being under the auspices of the Lincolnshire District Council for the National Registration of Plumbers.

VENTILATION FOR STEAMSHIPS.—We are informed that a large Atlantic Steamship Company are about to spend about 100,000*l.* in fitting their vessels with mechanical ventilation, the system adopted being Messrs. Baird, Thompson, & Co.'s patent combined system of mechanical and automatic ventilation.

AN ANCIENT PAINTING.—According to the *Halesworth Advertiser*, an important example of a Medieval painting of the Last Judgment has been discovered in the work of restoring Wenboston Church, in Suffolk. The painting is on oak boards which once formed "the upper part of the screen dividing the chancel from the church," so says the local paper; but the "upper part" of the road-screen is surely a mistake, as that would be on it; it is the lower part of the Suffolk and Norfolk road-screens which is so frequently painted. The paper referred to gives a lengthy description of the work, which evidently presents the usual features of a Medieval "Doom" painting, but it appears to be in unusually good preservation. "The picture," we are told, "was evidently subdivided into panels by an immense wooden cross fastened on with bolts, of which only the holes now remain, and the two bottom side panels were apparently formed by the carved images of patron saints which have also disappeared."

LEGAL.

INSUFFICIENT THICKNESS OF WALLS.

ELLIS MARSLAND v. W. J. GOLDSWORTHY.

On September 27 at the Lambeth Police-court, before Mr. Biron, Q.C., Mr. W. J. Goldsworthy, builder, was summoned at the instance of Mr. Ellis Marsland, District Surveyor for Camberwell, for erecting in the Friern-road, East Dulwich, a three-story building exceeding 25 ft. in height with walls only 9 in. in thickness. The Surveyor produced a section and photograph of the building showing that the height to the top of the topmost story was 28 ft. 2 in., and that according to Part I. of the first schedule, table 2, of the Building Act, the thickness of the ground story should be 13 in. On the part of the defendant it was urged that the rooms in the roof were only box-rooms, but as one was 7 ft. 6 in. in height, and the other 9 ft. 2 in., and each contained a window and one a fireplace, the magistrate was of opinion that the two

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with columns: Nature of Work, By whom Advertised, Prelimin., Designs to be delivered. Includes entries for County Buildings, Rapsala, etc.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be received. Includes entries for Rapsala, etc.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv, vi, viii. Public Appointments, p. xxi.

rooms constituted a story, and made an order that the top story should either be removed or the walls on the ground story made 13 in. in thickness.

BAD PLASTERING.

ELLIS MARSHALL V. C. WATTS. ON September 27 at the Lambeth Police-court, before Mr. Biron, Q.C., Mr. Charles Watts, builder, District Surveyor for Camberwell, for a breach of the By-laws relating to plastering at a certain house in course of erection in the Worthingham-road, East Dulwich. The Surveyor produced several specimens of the plastering taken from the walls and ceilings of the building, also two analyses of the material showing from 15 to 18 per cent. of earthy matter, and explained that the defendant had a mortar mill, and surrounding it were heaps of all sorts of rubbish, which was ground up in the mill with a small proportion of lime and hair; whereas the By-laws provided that clean sharp sand, without loam or earthy matter, or ground brick, or furnace slag, to the satisfaction of the District Surveyor, mixed with lime in the proportions of 3 to 1, were the only materials allowed to be used, with the addition of hair. The Magistrate fined the defendant 5l. and 2s. costs.

MEETINGS.

- SATURDAY, OCTOBER 1. Architectural Association. - Visit to St. Alban's Abbey, St. Michael's Church and Gateway. Mr. James Neale, F.S.A., will act as guide. Train leaves at 2.5 p.m. from St. Pancras. Dundee Institute of Architecture. - Excursion to Clatto Reservoir and places of interest in the districts of Auchtermuchty and Meigle. MONDAY, OCTOBER 3. Society of Engineers. - Mr. B. A. Miller on "The Cleansing and Ventilation of Pipe Sewers." 7.30 p.m. TUESDAY, OCTOBER 4. Sanitary Institute (Lectures for Sanitary Officers). - Sir Douglas Galton on "Ventilation, Warming, and Lighting." 8.0 p.m. Glasgow Architectural Association. - Mr. W. J. Anderson on "Street Architecture of Modern Glasgow." 8.0 p.m. WEDNESDAY, OCTOBER 5. Builders' Foremen and Clerks of Works Institution. - Ordinary meeting. 8.30 p.m. THURSDAY, OCTOBER 6. University College, London. - Professor T. Roger Smith on "Architecture an Art, a Science, and a Profession." 7.30 p.m. FRIDAY, OCTOBER 7. Architectural Association. - Opening Conversations, to be held at the Imperial Institute, South Kensington, S.W. Sanitary Institute (Lectures for Sanitary Officers). - Mr. H. Law on "Principles of Calculating Areas, Cubic Space, &c." 8 p.m.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,351.-WATER CLOSETS: W. T. Allen. This invention relates to an improved form of adjustable water-closet, consisting of a reversible cone basin of earthenware, or other suitable material, of any required section, with combination of the same to be applied to the bottom of deep water-closets, with inlets right and left to connect the surface drain for flushing the same, the centre to be a receptacle for excreta to pass through a trap to the main drain.

14,935.-VENTILATION: J. A. Hart and C. Baynes. This invention relates to an apparatus for the purpose of supplying fresh air to workshops or other apartments or buildings, the combination of fresh air inlet terminating in what is termed the upper stratum of the place to be ventilated, and there furnished with a fan, with the outlet for air therefrom around a horizontal, or approximately horizontal, periphery, so as to paratively thin layer into the said upper stratum in a compass to distribute the air through a considerable area, without causing objectionable draughts in what are workshop, &c. There are also, in combination with the fan, blades situated at the upper or lower side, or both, for creating currents of the air of the workshop, apartment, or building, to mix with the fresh air being forced therein by the fan.

14,936.-DRAIN-TRAPS: J. M. Dobson. The objects of this invention are the production of a better and solid matter, and washing out of the suspended matter, the lessening of the volume of water forming the seal of the trap, so as to offer the least possible resistance to the action of the inflow of sewage giving the seal; and the shortening and lightening of the trap, that it may be more easily handled, and cost less in its application to existing drains. For details we must refer our readers to the drawings attached to the specification.

14,937.-MASON'S TOOLS: J. G. Morda. This invention relates to mason's chisels, and like tool, and has for its object to make a single tool with interchangeable bits, so as to take the place of a number of tools at present. The inventor makes the chisel with a horizontal metallic shaft, or handle, which is broadened or tapered out and tapered at its lower end. The flattened out part is made with a groove, and is adapted to fit into the recess, or preferably tapered groove, or which there may be any desired number to suit the different classes of work. The bit is preferably tapered, end walls, or projections, to prevent the bit having lateral movement when being used.

14,938.-SYPHON CISTERN: R. Biscoe. This invention relates to an improved siphon cistern for flushing water-closets. The short end of the siphon is connected to back of service box, which has a loose plate working in a groove. The connecting rod is pivoted on a lever and to the loose plate, and on pulling down the water in the lever it pushes the loose plate down to the bottom of the service box, thereby forcing the siphon, and starting the flush. For details the service box must be referred to the drawings. The flow of water into the cistern is stopped, when a weight is taken place, the cistern is refilled by means of a ball-tap water-filling service box round the edge of the loose plate.

14,939.-DOOR-SUPPORTS: A. Gerber. This invention consists essentially in applying to doors, which have hitherto been swung free and supported only by the hinges or hooks, supporting or guiding rollers at the upper edge of the door, or at almost extreme end of the free-swinging door, and so taking the weight off the hinges or hooks.

14,940.-SEWER TRAPS: R. Newton. This invention has reference to improvements in the class of sewer-traps in which the siphon is fitted so as to prevent after the first burst of water it has broken as soon after the trap, so that a sufficient quantity of water must at all times remain in the trap to secure a practical and sufficient seal. It consists of a chamber having an inlet and outlet, the inlet being provided with a cap soldered thereto, and at the top of the lower edges thereof a flanged ring is soldered to the chamber, which is furnished with holes, through which this ring device, such as bolts, extending through the edges of the flange, this plate down to close the upper portion of the chamber. Extending from the upper edge of the chamber is a partition dividing the upper portion of the chamber into two unequal parts, the larger being on the outlet side. This partition extends to within a

CONTRACTS.-Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Includes entries for Construction of Sewer, Roadmaking and Paving Works, etc.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in. Includes entries for Engineer's Assistant, Resident Engineer, Clerk of Works, etc.

NEW APPLICATIONS FOR LETTERS PATENT.

- September 12.-16,384, W. Jennings, Electric Call-bell Indicators. - 16,321, R. Kelly, Hand-power Tensioning Machine for wood working. September 13.-16,341, T. Caink, Saver Ventilators. - 16,353, H. Richter, Holder for Sliding Sash Windows. - 16,354, J. Keseling and C. Fuchs, Artificial Stone. - September 14.-16,429, J. Motherhead, Door-knobs and Latches for Doors. - 16,438, E. Smith, Spring Lead Direct from G-leads. - 16,443, J. Barlett, Warming and Ventilating Buildings. September 15.-16,479, J. Keal, Flush-out Water-closets, flushed with waste water. - 16,519, T. Brown, recess is clamped. - 16,528, J. Northcott, Door-bolts. September 16.-16,466, W. Dunlop, Cooks or Pots for Chimneys and Ventilating-shafts. - 16,673, H. Mckenzie, New process for the manufacture of Paints, Varnishes, and Stirog Cement. September 17. 16,000, W. Westlake, Door-holder. - 16,006, E. Baker, Window-fastening. - 16,612, R. Cartwright, Water-closet Apparatus. - 16,619, Yates, Haywood, and Co., and others, Adjustable Fire-grates. - 16,623, W. Kees, Grates or Grates. - 16,631, H. Barley, Siphon Cisterns. - 16,619, G. Evans, Wood-screws. - 16,656, F. Plumstead, Electric-light Fittings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

- 15,593, E. Ballard, Wall Ventilator. - 12,471, W. Rockliffe and E. Jobling, Door-frames. - 13,546, M. Eyer, Siphon Flushing Tank. - 13,947, C. Openshaw and R. Wood, Indulging Brick for building in brick or other walls, to carry joists or other members to prevent rot. - 14,226, G. Martin, Glazing Roofs and Sky-lights. - 14,231, J. Wall and J. Rees, Ladders. - 14,233, S. Challen, Sash Windows. - 14,297, J. Lester, Fastenings for Door-knobs. - 14,577, G. O'Reilly, Wedge Door-handle Fastener.

COMPLETE SPECIFICATIONS ACCEPTED.

- (Open to Opposition for Two Months.) 15,523, D. Morison, Flanges for Pipes. - 13,162, H. Gower, Electrical Lamp and other Fittings. - 10,511, J. Main, Greenhouses and similar Horticultural Buildings. - 13,557, C. Nabe, Adjustable Clamps for Bench Vices. - 13,622, B. P. well, Pipe Joints. - 14,724, E. Edwards, Feeding and Driving-in Nail.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

- SEPTEMBER 29.-By G. Brinsley: 59, Walton-st., Chelsea. - 36d. 5d. 40d. - By R. Jolly at Co. 13 to 21 1462 18s. 1, 2d. 1, and 3, Robeson-st., ut. 70 yrs. g.t. 31s. 6d. SEPTEMBER 21.-By Wells & Reed: 56, 55, and 64, Parley-st., Stamford-hill, ut. 92 yrs. g.t. 30s. 1, 4, 500s. - By J. Young: 13, Ceylon-road, Kensington, f., r. 26s. - By J. J. Freesevered, Holloway, ut. 64 yrs. g.t. r. 4s. 7d. 37s. 9 and 13, Freesevered, ut. 64 yrs. g.t. 12s. r. 84s. (including mortgage) 7s. 6d. 10 Freesevered, ut. 64 yrs. g.t. of (including mortgage) 555s. - By H. Griffin: 9 to 12, Wimpers-rd., Battersea, ut. 63 yrs. g.t. 112s. 4s. 78s. SEPTEMBER 22.-By F. Peck: The lease of No. 159, Piccadilly, ut. 99 yrs. r. 370s. 1, 700s. - By C. N. Phillips: 21, Grafting-house, 111, Highgate-rd., Hampstead, f., r. 70s. 9d. - By J. Somers: 22 and 23, White Horse-lane, Mile End, f., 670s. - By J. Somers: 24, White Horse-lane, Mile End, ut. 51 yrs. 405s. 5s. 58s.

"SOUTH NORMANTON.—For the erection of a board school for boys, South Normanton, Derbyshire. Mr. A. Macpherson, architect, 18, Tennant-street, Derby.

Husley £4,268 | Ford & Co. £3,790
Walker & Slater 4,080 | Bennett 3,763
Keeble 3,900 | Weston 3,519

SOUTH SHIELDS.—For the extension of Corporation Stables South Shields. Mr. Matthew Hall, Borough Engineer.—

T. Barks £1,170 0 0 | J. J. Mackay 945 0 0
Wm. Kennedy 1,063 0 0 | J. Young 922 0 0
W. Scott 815 0 0 | J. A. Murray 808 0 0
S. Sheriff 1,631 13 4 | Mackay 814 17 8
J. L. Miller 1,626 12 11 | W. Christie 876 6 4
W. J. Robertson 1,010 0 0 | R. Sumner 865 0 0
R. Brown 970 5 10

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The Builder.

VOL. LXIII. No. 2622.

OCTOBER 5, 1892.

ILLUSTRATIONS.

Ambores from the Cathedral, Salerno.—From a Drawing by Mr. Francis D. Bedford	Double-Page Ink-Photo.
Design for a Window, Trinity College, Oxford.—By Messrs. James Powell & Sons	Single-Page Ink-Photo.
Design for a Window, All Souls' College, Oxford.—By Messrs. James Powell & Sons	Single-Page Ink-Photo.
St. Saviour's Church, Folkestone.—Messrs. Somers Clarke and J. T. Micklethwaite, Architects	Four Single-Page Photo-Lithos.

Blocks in Text.

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Theatre Architecture at the Vienna Exhibition.



WE have referred more than once to the Musical and Dramatic Exhibition which was opened with great ceremony at Vienna in May last, but which in fact was not complete, nor were any catalogues published, till months after that date. The general scope of the exhibition is of course not within our limits, but the collection of plans of buildings for musical and dramatic entertainments, the latter more particularly, is of considerable interest.

The prefix "International," which now seems to be attached to almost every Continental exhibition, is hardly borne out by the facts; for though Russia, France, Italy, Spain and England have sent a few exhibits, Germany and Austria take absolute precedence throughout; and for a truly international exhibition of music and the drama, and the sciences and trades connected with them, we shall have to wait for the exhibition under the same title which is promised at Paris for next year, and which will probably be more comprehensive in this respect than the essentially Teutonic exhibition at Vienna.

The exhibition is favourably distinguished from many others of the same kind by the rigorous separation between art and science on the one hand and mere trade exhibits on the other. The exhibition has its "Historical Division," divided into musical and dramatic departments, and its *bond-fide* trade division. The two are under the same roof, it is true, but they are everywhere kept separate and arranged on a different system, the historical exhibits being arranged as a museum, in small compartments, and the trade exhibits in a large hall, after the manner of a bazaar. Large lettering and showy decoration have their way here, while in the historical division everything is treated with restraint and an entire absence of any sensational announcements. The building in which the exhibition is held is the Prater Rotunda (the

main building of the great exhibition of 1878), which has been cleverly adapted to its present use.

Of architecture as represented in the musical department of the exhibition there is not much to be said. Of the many interesting concert-halls to be found on the Continent only a few are represented, and only one fortunately a good one (the "Gewandhaus" at Leipsic, by M.M. Gropius and Schmieden), is illustrated by a complete set of drawings. It contains one large concert-room for an audience of 1,700 and an orchestra of 450, and there is a smaller room for chamber concerts, both famous for their excellent acoustic qualities. The open site on which it is placed has facilitated the planning, and it possesses the most satisfactory arrangement for ingress and egress, and the greatest amount of cloak-room space of any music-hall in Germany, while the general architectural effect of the exterior is satisfactory. The other Continental concert-halls shown are the "Musik Vereinshaus" of Vienna, the "Sing-Akademie" of Berlin, and the "Ton-Halle" of Laibach, none of which, however, are well illustrated. Foreign concert-halls seem only to be represented by the Carnegie Music-hall of New York; at least, we did not notice any other. The only other form in which architecture could be represented in connexion with music was in the representation of colleges or schools of music. Of the few buildings of this class exhibited only one has any claim to special notice, the Conservatorium erected some years ago at Leipsic from the designs of Herr Hugo Licht. This is a well-designed practical building, illustrated by a complete set of drawings.

In the dramatic department architecture plays a more prominent part, but the designs are rather scattered, having been arranged along with the other exhibits of the towns to which they belong; though there are two systematically-arranged collections, one of the plans of Baron Hasenauer, the other of those of M.M. Fellner and Helmer. As far as architecture is concerned the historical division hardly justifies its name, as few buildings prior to the end of the seventeenth century are to be found. Among the few are a model of a barn as adapted for the use of strolling

players, a plaster model of the market-place at Lucerne as adapted for the performance of a Passion Play in 1583, and a model of the Vienna market-place with its typical Theatre. It is only from an examination of the collections of MSS. and prints that one can obtain any information as to the construction and planning of theatres at different dates. Some particulars relating to the prevention of accidents in former days are of interest; and there are accounts of theatre fires in 1412 and 1569, which seem exactly counterparts, in their results, of some modern catastrophes, having been first followed by panic legislation and then by the usual relapse into apathy. Among the MSS. and prints are descriptions and illustrations of several of the large wooden theatres, of which a late example, the Teatro Farnese at Parma, with an auditorium measuring 150 ft. by 97, still exists. In the collections of prints of the eighteenth century a large number of the theatres erected in that age are to be found, together with minute details of construction, and at the same time information is obtainable as to a large number of the theatre fires of the time, sixty of which the eminent engineer Foelsch, of Hamburg, had already spoken of in a pamphlet dated 1878. But the plans and models of the theatres which take up so much space in the dramatic division refer for the most part to buildings of this century; and if the extensive alterations, which often amount to entire reconstruction, be taken into account, it would be more correct to speak of them as dated within the last five decades. There are but few drawings to be found of theatres that no longer exist, and as the average life of a theatre is under twenty-five years, it is not strange to find a comparatively modern collection of drawings illustrating so great a number of the leading theatres of the day.

Commencing with Vienna, the most elaborate set of drawings and models relate to the erection of the new Court or "Hofburg" theatre, built by Baron Hasenauer, and these illustrations have been arranged as a separate collection. There is a most beautifully executed plaster model of the building as a whole, and a similar one, to a larger scale, of the auditorium; then there are a large number of general working drawings

and details of masonry, all in pure outline showing remarkably fine draughtsmanship; also some sketches for bronze fittings, and a number of photographs showing the effect of different parts of the building and illustrating some of the fresco work and sculpture.

Of the other Vienna theatres, all are illustrated, with the exception, strange to say, of the Royal Opera House, one of the most interesting buildings in the Austrian capital, in the auditorium of which there is room for an audience of 3,000 persons. The "Karl" and the "An der Wien" theatres are the two most important of the old "private" theatres of the city, but neither of them can claim notice as architectural monuments. To those who have known these two buildings prior to 1881 they would, however, now serve as excellent examples of the results which can be obtained by systematic legislation, when a dangerous structure has to be converted into a safe one. The only modern play-house which is subsidised is the "Deutsches Volkstheater," which was erected by Messrs. Fellner & Helmer, of Vienna, in 1887. This building, which stands on an open site, is considered to be one of the best of the symmetrically-planned theatres on the Continent. It can seat an audience of 1,873 (819 on the ground floor, and the rest on two tiers), and can boast of both a pleasing interior and exterior, but it has cost nearly 40,000*l*.

The only other drawings of a modern Viennese theatre which has ceased to exist are those of the unfortunate "Ring" Theatre. This building was erected after plans by E. von Foerster, and was opened in 1874, only to live a short life of seven years. The architect's original drawings are exhibited, including some pleasing water-colours and a large perspective, and on examining these sheets it may be observed that the plan of the building was by no means so unsatisfactory as the fearful calamity which befell it would have led one to expect. It would, perhaps, be well to compare the plan of this Viennese theatre with those of the majority of play-houses situated in countries where "moderate expenditure" is still in vogue, when the safety of the public is concerned. It has often been asked why one nation has more theatre catastrophes than another, although the most unfortunate of the two may have a paternal Government? This difference is not so much due to good luck as to the character of the audience in front of the curtain and of the *employés* at the back. Where the former are not of an excitable temperament, and the latter are cool and well drilled, a catastrophe which would be inevitable with an excitable audience and nervous officials, may be avoided, without any special credit being given to the planning and construction of the building.

The collection of architectural exhibits contributed by Budapest consists mainly of drawings and photographs of the Hungarian National Opera House, which was erected from the design of Ritter von Ihyl, and opened in 1884. This much-admired building only has 1,267 seats in its comparatively large auditorium, each of which has cost about 2,525 florins, as the total expenditure on the structure was 3,200,000 florins. On the Continent, the Budapest Opera House is considered to deserve the careful attention of architects as one of the most interesting examples of modern work in which scientific planning and construction on the one side, and artistic design on the other, may be said to have gone hand-in-hand, and where the result has naturally been satisfactory. It should be noted that the auditorium was in reality planned solely for the accommodation of the Hungarian magnates, and that this fact is the real reason for the small seating capacity; and, secondly, that Herr Ihyl was one of the few theatre architects who could boast of having pleased both the audience and the *employés*.

The valuable collection of designs by MM. Fellner and Helmer gives a fair idea of the number of theatres erected by these eminent Vienna specialists, and includes illustrations of some

of the best examples of theatre-architecture in countries outside their own, and above all serves as an excellent inventory of the provincial play-houses in the Austrian Empire, the majority of which are monumental structures, owned by the respective Municipalities. Most of the last-named buildings (the dates of which range between 1868 and 1891) are shown in large working drawings accompanied by strongly-coloured perspectives, and, in some cases, also by models and photographs. There is the Brünn Theatre (which has given its authors great satisfaction and was planned to accommodate an audience of 1,400), then the municipal theatres of Presburg, Salzburg, Reichenberg, Karlsbad, Fiume, Szegedin, Waresdin, and Ternevar, and further the new "German Theatre" at Prague. These houses have seating capacities varying between 750 and 2,000, and each has some points of special merit; but it should be remembered that these buildings are but minor examples of the Vienna firm's erections when compared with such structures as they have lately put up at Odessa, Zürich, or Berlin.

The Odessa Theatre, a building which holds an audience of 2,500, and in its plan shows the first unquestionably successful scheme of decentralised exits, may at present probably be considered the most elegant play-house in Russia. It eclipses all similar structures in the Russian capital, and is not likely to be classed second until the proposed Imperial Opera House at St. Petersburg has been opened. The drawings for the Czar's new opera-house are hung in the extensive collection representing the "Muscovite Court Theatres Administration," the executive of which has charge of the most elaborate combination of Court play-houses and dramatic schools in the world. Privy Councillor Schroetter, the architect-in-chief to this executive, who is the author of the design, has this time exhibited a more complete set of illustrations than he sent to the Berlin International Art Exhibition. His stage measures 32 metres by 41 metres, by 42 metres, and the auditorium, besides having very ample accommodation for the Royal family and the Court dignitaries, provides seats of most luxurious dimensions for 2,100 visitors. Luxury is the great feature of the design throughout, so that the large auditorium occupies but a small fraction of the cubic contents of the block; the facades, however, are of simple and unostentatious architectural character. Of the theatres at present in the hands of the Muscovite Administration, three at St. Petersburg and one at Moscow have (much to the surprise of those informed of the usages of Russian authorities) been illustrated at the Vienna exhibition. All four were built prior to 1860, and can scarcely be termed good examples of theatre-planning; yet, if the drawings are correct (not always the case in Russia, on account of Police regulations), the houses have apparently been subject to alterations and improvements which tend to make them agreeable and safe, and they have received the most improved and expensive fittings, as far as the lighting, ventilation, and machinery are concerned. These expensive fittings, which for the most part have, however, been introduced in a very desultory fashion, are probably to be seen in their fullest development in the Warsaw Opera House, which was reconstructed at an enormous cost last year.

Whatever criticism the Russian architectural exhibits may call for, it is but fair to acknowledge the pains taken by the organisers of that group to give "architecture" a prominent place in their show. France has not a single architectural drawing at the Vienna Exhibition, although its group of exhibits is an extensive one, and in the space devoted to England not a single contribution of the kind is to be seen. Spain has only sent a coloured section of the "Teatro del Liceo" at Barcelona, and a few plans of the stages of other theatres in that city. Sweden, with its small resources, has at all events shown some neat pen-and-ink drawings, and a sepia perspective of the Opera House at Stockholm, which is

being re-constructed by the well-known architect, A. J. Anderberg. Then there is Switzerland, which is, however, only represented by the excellent drawings of the new Zürich Theatre, hung in the "Fellner and Helmer" collection, and Italy by a coloured section of the "Scala" at Milan, and a fairly complete set of illustrations of the "Teatro del Filodramico," which was put up by Signor Giovanni Giachi in the same city. A design by the last-named architect for an Opera House at Buenos Ayres (illustrated by a photograph of the model) can still be noticed as a contribution from the non-German countries, but with the mention of this exhibit the list of "foreign" theatres shown to the visitors of the so-called "International" show must also be closed, as the only other piece of architecture which could claim remark under that heading has not yet been carried out, and, having for its author the late Gottfried Semper, can only be classed with the German exhibits, although intended for Rio Janeiro.

Returning to the exhibits of the various German-speaking countries, those relating to Semper's work at Dresden are among the most valuable. The fine set of black-and-white drawings which illustrate the old Dresden Opera House of 1841 (destroyed by fire twenty-eight years after), and another set illustrating the new Court Theatre, which was opened in 1878, are both remarkable for the beautiful and careful delineation of those parts of the elevations which are curvilinear on plan. The designs of both these buildings, as well as of the one for Rio Janeiro, mentioned just now, and further, the design of the proposed Munich Opera House (which Semper made for the late King Ludwig in 1886), all show the same preference for the curvilinear front, behind which is placed the usual Continental *foyer*, and at the same time each of these conceptions includes in some form or other two main staircases flanking the auditorium. The plans illustrate a series of improvements which, if they had been given form as intended in the Munich structure, would probably have brought about a revolution in modern theatre construction, the extent of which can at present only be judged by the effect which a knowledge of the unpublished plans had on Herr Brückwald's Bayreuth "Festspielhaus." The design for the proposed Munich Opera House is, fortunately, at last put before the members of the architectural profession, with an adequate number of illustrations, and the mystery which was somehow connected with this hidden design put an end to. There are not only four of the author's remarkable pen drawings to be seen, but also a very fine model, and these together help to demonstrate Semper's ideas of combining the Grecian Amphitheatre with the modern play-house. The very beautifully-executed model is certainly the *pièce de résistance* of the Munich group, as neither another model showing the historical "Gaertnerplatz" Theatre of the Bavarian capital, nor any of the many designs for a new Royal playhouse conceived by Herr G. Dollmann and Herr Ad. Seder in 1874, can call for much attention. That drawings of the Bayreuth Theatre are not exhibited in the Bavarian group is disappointing, as the publications of that building show the plan only to a very small scale. Oberammergau is represented by some prints descriptive of its historical stage, and further by a plan of the new one which was put up by Herr Lautenschläger in 1890; whilst of other Bavarian towns Augsburg takes the lead with illustrations of its neat little Municipal Theatre, of which Messrs. Fellner and Helmer, of Vienna, were the architects.

Frankfurt-on-the-Main has sent a perspective of her Opera House which was opened in 1880. This architectural picture, which with most effective colouring, shows Lucae's very beautiful structure, is certainly the finest in the Exhibition, not excepting even that which illustrates Schinkel's Court Theatre on the Gendarmen Platz in Berlin, and bears this great artist's signature. That

plans neither of the Berlin Court Theatre nor of the Royal Opera House have been exhibited is not strange, as both these buildings rank among the most dangerous structures in Europe, and would greatly discredit a Government which behaves so despotically where unsubsidised theatres are concerned, whilst itself the owner of the most discreditable theatrical property in its capital. Of late, it is true, thanks to the constant pressure of the Berlin Fire Brigade, large sums of money have been spent on improvements in both blocks, yet these alterations are, as far as the Opera House is concerned, in reality of little or no value.

Drawings of the Victoria Theatre at Berlin, which was pulled down last year, are also shown, and these illustrate one of the most original buildings of its class, which had a summer and a winter auditorium (each for an audience of some 2,000) placed on either side of a central stage. Of modern erections the Lessing Theatre of 1888 (which has been illustrated in the *Builder*) is exhibited, but it is only interesting on account of its plan, to which Messrs. Hennicke and V. d. Hude gave much attention, and for the decoration of the auditorium, which, although exceedingly cold in colouring, has certain merits. Messrs. Fellner and Helmer's "Theater Unter den Linden," which was opened a week or two since, is also represented, but not in such a way as to do justice to Berlin's finest play-house. This building, which is devoted to superior "variety" entertainments, does not stand on an open site, as by some clever strategy the architects had the preliminary design passed through the offices of the local Building Police as an "assembly hall," whilst in reality, with its capacity for 2,500 visitors, its tiers and promenades, this structure is a *bona-fide* play-house, and bears no more resemblance to an assembly-hall than the "Empire Theatre" in London. It is, however, in spite of its position, a most satisfactorily planned theatre, and a structure of the highest order. The stucco decorations are indeed somewhat over exuberant, though carefully designed in detail.

Any description of the many exhibits relating to "stage technique" would require much space, especially if the more modern examples were treated of, and hence only a few of the most important illustrations, which are in form of models and drawings attached to the local groups to which they naturally belong, can be noticed. Among the Vienna exhibits of this class is a full working model of the new "Hofburg Theatre" stage, which clearly shows how its engineer, Herr Bretschneider, considers that hydraulic power can be made use of for stage effects in a more practical way than in the so-called "Asphaleia" system, which was tried in theatres at Budapest and Halle with unsatisfactory results. This model serves as an absolute contrast to one which shows the wooden stage of the great Vienna Opera House, the working of which, although resulting in the attainment of very superior scenic effects, is uncommonly complicated, and (no matter how well superintended by the engineer, Herr Rudolf) is far too dangerous for a building that is so ill-protected as far as risks of fire are concerned. Other examples of such old-fashioned stages are illustrated in a model of the stage of the old "Burg" theatre which has been pulled down, and in a similar model of the Munich "Gaertnerplatz" theatre as it was in 1827. It is interesting to compare these models with the one first named, and then to note the progress made in stage construction during the present century (or rather in the last fifteen years). The "Asphaleia" system, above mentioned, is only illustrated at the Vienna show in drawings of the Budapest Opera House, as financial and other reasons prevented the interesting model of the late Asphaleia Company (which was to be seen in London in 1888) being put into repair for this exhibition. It may be, however, of interest to note that the system as adopted in Budapest has not quite

as many advantages as Mr. Emden ascribed to it when giving some details of the scheme before the Society of Arts; in fact, the engineers in charge of both the Hungarian and the Halle etages now tell a very different tale from that given in the pamphlet of the company. There is little doubt that the "Asphaleia" stage, as an extreme contrast to the former wooden ones, has done great service in furthering the new science of stage-engineering, but at the same time some such system as Herr Bretschneider's, which stands between the two extremes, will probably be the one adopted in future theatres. Herr Brandt has exhibited a large working model of a set of "cuts," "sliders," "traps," and hydraulic motors as used with good results in the lately reconstructed stage of the Berlin "Court Theatre," and Herr Lautenschläger, of Bayreuth repute, has, among other drawings, sent a set of illustrations of the proposed reconstruction of the stage of the old Munich Opera House, to which he is engineer-in-chief. Of the stage appointments a most varied collection is naturally to be seen in the Trade division of the exhibition, but no novelty of special merit can be found among them. If any one of these exhibits deserves mention, it is the unimflammable pieces of scenery sent by Messrs. Mueller & Schaefer, of Berlin. They show two kinds of fabrics which have been put through systematic trials by the officers of the Berlin Fire Department, and have afterwards been highly recommended by the Prussian Government; but they are unlikely to find a market, on account both of their heavy weight and high price.

The collection of paintings and sculptures in the "Dramatic" department is of considerable interest, and even when the architectural visitor emerges into the grounds of the exhibition he still finds work before him, as many of the provisional erections, in which our Continental neighbours excel, are of great merit. Among these are the reproduction of an old Vienna market-place and a concert-hall of large dimensions, and last, not least, an exhibition theatre, built by Messrs. Fellner & Helmer, and already described in a former number of this journal. It is in this last-named building that the so-called "International" Exhibition can for once fully claim its official description, this theatre being the resort of many foreign companies, as well as of visitors from all parts of the world.

ECCLESIASTICAL ART AT THE CHURCH CONGRESS.



ACH year we are informed that special pains have been taken to procure a good exhibition of ecclesiastical art at the church congress, but in this as in former years, the result does not bear out the promises that have been made. The loan exhibition looks very well in the catalogue, but the objects of real interest are not numerous. The "magnificent altar frontal" of the parish church of Folkestone, worked by seven ladies and presented to the church, may be a fine piece of work, but it was not in evidence on the occasion of our visit, the explanation being that it was in use that day in the church; in which case it should hardly have had place in the catalogue.

The fact is that the loan collection is a very heterogeneous affair, and one cannot but be surprised at the varied character of the exhibits which are pressed into the service as representing ecclesiastical art. Among other things we noticed two sporting sketches, some drawings of ships, a bit of Venetian lace, a Norwegian "bride's belt"—a pretty bit of metal-work this last, but in what sense "ecclesiastical"? Apparently it seems enough that an object should be lent by a clergyman to constitute it "ecclesiastical art." We fear visitors will hardly all rest satisfied with this view of the subject.

Among the few things that are of interest is a modern cope presented to and lent by the Dean of Rochester, designed by Mr.

Kempe, and worked by the Clewer Sisters. The main surface of the cope is a damask pattern suggesting a little too much the idea of a curtain, but the border is a fine and broad piece of Gothic design, carefully carried out. A set of Armenian priest's vestments, lent by the Rev. A. Saunders Dyer, though simpler, has a finer style and feeling about it, and the priest's hat is a really artistic object, well designed and not obscured in its lines by any redundancy of ornament.

Among the plate which has been lent for the occasion, and which is not a very remarkable collection, some few pieces teach the same lesson of the superior value of simple and well-designed outline. An Elizabethan silver chalice, lent by the Rev. Spencer Philips, with its short stem and spreading bowl of finely-curved outline, is a good example of its class. So is the silver chalice (date 1577) lent by the Rev. E. B. Russell; a cup similarly characterised by good lines, with a little delicately-chased pattern forming a band round the bowl. Another item is a small two-handled silver vessel lent by the Rector of Hythe, and belonging to the church of SS. Mary and Radegund (where?), up to 1850 used as a chalice at the celebration of Holy Communion in the parish church of Postling. The catalogue says—

From the Hall-marks it appears that the date is 1701-2, being of the "New Sterling" silver, with figure of Britannia and lion's head erased, the maker's mark being AN (William Andrews). The donor is unknown, and it is probably the only one of the kind now remaining in Kent. Archdeacon Lee mentions two similar cups of the "porringer" shape as still existing in the Archdeaconry of Worcester. He considers that they were "probably taken from domestic use," but proceeds to add that "they probably bear more resemblance than any other pattern in shape, if not in size, to the cups of the Early Church, which are described as having two handles or 'ears.'"

The lower portion of the bowl is decorated with a repoussé scallop ornament in spiral lines. It is a thoroughly good bit of metal design of a simple kind. The church plate from St. John's Church Sidcup, lent by the Vicar of Sidcup, has a character of its own; we presume the pattern is a modern piece designed to match the flagon and chalice. The communion plate from Kennardington, Kent, lent by the Rector, has also the character of extreme simplicity combined with good lines. One may better appreciate this by comparison with some old plate which has not the same characteristics, such as a silver chalice of Gothic design lent by Messrs. Fairpoint, "dated 1729, but probably of much earlier manufacture." It probably is so, but that does not prevent its lines being clumsy and ill-designed. The Renaissance chalice, "silver-gilt with chased plaques," exhibited by the same donors (or loaners), though of interest, is also a bad piece of design; the foot and stem being out of all proportion to the small size of the bowl, which looks like an afterthought. In such an article as a chalice the cup is the essential portion, the stem should only be developed sufficiently to give a look of firmness and ample support to the bowl. A pair of plated candlesticks curiously designed like a Gothic shaft of quatrefoil section, but with a Classic capital at the top, have distinct character; these are old work of course; no one would venture such a thing now. But the modern chalices, in imitation of the orthodox and admirable Medieval form, look too much like servile imitation; there is really no design in them; they are practically mere copies.

Of the drawings in the loan collection we have the satisfaction of publishing in this number those which are most to the point, viz.: the set of drawings for St. Saviour's Church, Folkestone, by Mr. Somers Clarke and Mr. Micklethwaite. These are a good set of drawings showing the special treatment of terra-cotta in church architecture, with details as well as perspective views, and are worth study, hence they are naturally hung rather away in a corner, not being among the things that interest the average ticket-holder. We refer the reader to the

* "Stage engineer" is now a recognised profession in Germany.

lithograph plates in place of further description. Among the other drawings collected are one or two original sketches by Flaxman of sacred subjects, which, slight as they are, always have their interest, and a few scattered sketches of old buildings by various hands. There are one or two elaborate examples of modern illumination, which show certainly a great deal of patience and painstaking, but no feeling for colour; a defect which it must be admitted they have in common with a good many Medieval illuminations, among which precedents may no doubt be found for the crude colouring exhibited in these modern examples. But there is no merit in copying the defects of Medieval work.

The small collection of brass rubbings lent by Mr. Franke, though consisting mostly of well-known work, includes two unusual examples of German Renaissance brasses which are of interest. From these we pass into the portion of the collection which is not "Loan," and which might be described most correctly as "Trade." There is some exception to be made in regard to some of the stained-glass work fixed in the vestibule. Mr. E. Frampton's two-light window for St. James's, West Hampstead (figures of Augustine of Hippo and St. Chryseostom), is dignified in design and fine in colour, having that depth and richness of tone in which so much modern stained glass is wanting, and there is a delicate little St. Cecilia panel by the same artist which is very pretty. Most of the rest of the exhibits bear more or less the impress of being, as in one case they are described, "from — & Co.'s glass works"; as if designs of this kind were to be turned out, like drain-pipes, from a contractor's yard. What would be thought of a picture exhibition in which paintings were described as "from — & Co.'s painting works"? In cases where the windows are not so described, there is still too much of the appearance of work done to order at so much a figure; and the two or three independent artists of high standing who have devoted themselves to glass design are conspicuous by their absence. But the trade element is absolutely predominant in the large room where exhibits of church furniture and decoration are arranged. There are the usual brass letterne with mechanical-looking eagles on the top, all on the same pattern, the usual brass candlesticks, brackets, ewers and chalices, nearly the same everywhere, just as they are seen in the trade catalogues, and the usual assiduous attendant on the watch to huttonhole the critic if the latter gives him a chance. To call this ecclesiastical art is absurd; it is simply a trade in metal-work produced in stereotyped patterns which have received the *imprimatur* of fashion. Last week we published a simple design for an altar-croze and candlestick by an artist; they are neither costly nor highly elaborated, but there is an idea in the design, instead of such a mere repetition of stock forms as were ranged along the room at the Folkestone exhibition.

Whether this kind of exhibition satisfies and interests the clergy who attend these congresses we cannot say; but if it does, the fact says little for the artistic taste and training of the clergy. If architects were invited to exhibit designs of churches and church furniture and decoration, and artists were invited to exhibit designs for stained glass, exhibitions of real interest and value might be got up in connexion with the church congresses. As it is, the loan exhibition of ancient work, though containing some items of interest, is but a poor affair, and the rest of the exhibition is simply a church furniture bazaar, in which trade interests alone are concerned. The managers of the exhibition do not appear to know what sort of things to provide or what sort of people to go to for them, in order to secure anything which could be truly called "an exhibition of ecclesiastical art"; and we may intimate that unless all this is altered, we shall not in future think it necessary to take any notice of the Church Congress exhibitions.

NOTES.

JUST as we were going to press came the melancholy news of the death of Lord Tennyson, a loss to the nation which will be felt by educated men of all professions. It belongs more especially to our literary contemporaries to estimate and appreciate the value of his legacy to the literature of this country; but, speaking from the artistic point of view, whatever difference of opinion may exist as to what may be called the philosophic value of his poetry, it must be agreed by all that in one of the highest and most delicate forms of art, that of finish of form and expression in language, he was one of the most perfect artists of whom we have any record.

IT would almost seem that the distinguished witnesses examined on Wednesday before the Water Supply Commission were practically witnesses in the interests of the water companies, at least that would be the conclusion to which many readers would naturally be led on reading the report of the evidence by Mr. Hawksley and Sir F. Bramwell. According to these gentlemen, whose professional eminence is certainly beyond dispute, it would seem that "whatever is, is right" in regard to London water supply, except that we are allowed too much water. Mr. Hawksley makes what must seem to many of us (and evidently did seem to the Chairman) the astounding statement that bad water supply has little or nothing to do with cholera. After this we may certainly take *cum grano* the same witness's assertion that (contrary to a mass of medical testimony) that there are no drawbacks to obtaining water supply from an open river into which all kinds of things may be thrown or drained, even with the most efficient preventive police. Sir F. Bramwell throws out a pleasant prospect of the water companies having powers to further reduce the consumption of water, the demand for which (per head) must inevitably tend to increase rather than diminish in these days. Such a reduction could only be brought about by a system of house-to-house visitation and interference which would be exasperating, and which public feeling would never tolerate. Waste might be efficiently checked by meter supply, no doubt, which we regard as a system worth at least serious consideration, unless (like ancient Rome) we can obtain a supply so liberal that a certain probability of waste may be faced without anxiety. There is water enough in the world if we can only get it to the places where it is most wanted, and get it in a safe way, and not along open rivers. Meantime, we cannot but think that the engineering experts are entirely in the wrong in looking to a diminution of supply per head in the future. More and more water is being used for bath purposes as certain sections of the population grow more healthy and cleanly in their habits, and we want to encourage that tendency and not to check it. The consideration that meter supply might operate to check the proper use, as well as the waste of water, is the one serious objection to that system of house supply. A further witness on Wednesday, Mr. Birch, asserted that in August, 1887, when the companies were abstracting 101,000,000 gallons from the Thames, 175,000,000 more might have been taken without injury. There will not be much left of the Thames if it is to be handled in that manner.

WE have received a copy of a paper read by M. Chas. Lucas at the congress this year of the "Association Littéraire et Artistique Internationale," on the subject of "La Propriété Artistique en matière d'Architecture (Signature de l'œuvre architecturale)." M. Lucas appears to confine himself to citing cases in the past in which the architect has been recognised by name as the author of the design of the building, and commemorated

by any inscription of his name on the building or the erection of his statue in or near it. The instances from past times which he has collected are of interest, but in regard to the present day the personal credit of the architect for his design may be said to be universally admitted. The difficult point for consideration is, how far the architect has or should have any power to prevent the reproduction of his design in another building and under other superintendence. That is really the only point that requires to be settled, and on that M. Lucas does not offer any definite suggestion.

IT is doubtful if many of the sea-side towns which lay themselves out to attract summer visitors for a few weeks really benefit the local community to any appreciable extent. One thing, at any rate, is certain, that the proprietors of the houses which are let out in rooms to visitors carry on a precarious and often wholly unprofitable business. Whitley is one of the towns which has never gone out of its way to attract visitors, though there is now a small visitors' quarter. To a large number of persons the fact that Whitley retains its old characteristics of a fishing port makes it much more attractive than many brand-new and more pushing places, and in all probability the town is more thoroughly prosperous than others which depend so largely on the patronage of strangers. But Whitley may well remain the same town in general characteristic and yet be largely improved in details. For example, the West Pier, a solid stone structure, formed to act as a breakwater and to facilitate the entrance of fishing vessels, is beyond all comparison finer and more attractive than the trumpery wooden and iron structures which are found at most watering-places. But as a promenade it is spoilt by the inequalities of the flags, which are so uneven as to retain large pools of water twenty-four hours after rain has ceased. From the West Pier and the shore approach a broad road (having the ridiculous name of the Khyber Pass) winds to the West Cliff; at its very commencement it is made hideous by a piece of bare ground, on which stands an unsightly and unsavoury urinal. It ought not to be beyond the enterprise of the Whitley Local Board to erect a small stone structure in keeping with the pier, which would answer the same purpose, and which should contain a retiring-room for women, as well as lavatories and a waiting-room. A little higher up a hideous corner of waste ground should be made rightly by being enclosed with iron fencing and planted with shrubs. It would also be well if measure were taken to do away with the perforated grating found about 20 yards apart down the centre of the streets, and from which smells worthy of old Cologne attack the nose of the passer-by. Such things are good neither for resident nor visitor. Various other details in which the town requires improvement could easily be mentioned. It is high time that Whitley took a leaf out of its neighbour Scarborough's book, a town which is vigorously and admirably governed. The people of Whitley should rouse their Local Board; without in the slightest degree changing its character, or destroying its old-fashioned charms, it is possible by intelligent administration to make Whitley a pleasanter and a more healthy place. Public spirit alone is needed to do this.

IT was recently stated that a committee was to be formed to collect subscriptions for purchasing, and converting into a Handel museum, the supposed birthplace of the great composer. The house is No. 4, Nicolai Strasse, Halle. Having been lately used as a beer garden, the premises are offered for sale, with the view to the building of a brewery over the site. Handel came to England in 1710. He is known to have lived in London at Burlington House, Piccadilly, for three years—*teste* Sir John Hawkins's Dictionary of Music; and in

Brook-street, Mayfair, in a house that about ten years ago was renumbered 25, and is distinguished by a tablet set in its front by the Society of Arts. The statue which Roubiliac made for Tyers at Vauxhall Gardens, his first work in this country, was, in February, 1889, at Mr. Alfred Littleton's residence at Sydenham, and had belonged to the Sacred Harmonic collection. It represents Handel as Orpheus, with a lyre, and was placed beneath a Doric portico in the Grand South-walk there. This statue is shown in Canaletti's view, 1751, and was included, we think, in the final sale of the Garden's effects in 1859. The monument in Westminster Abbey is also by Roubiliac, being, it is said, his last work. The first Handel Festival was held in the nave on May, 1784; after 1791 they transferred the performances on two or three occasions to St. Margaret's; ones have been given at the Chapel Royal, Whitehall, now lent to the Royal United Service Institution. When living in Mayfair, Handel attended services in St. George's, Hanover-square, where he used to sit in his sedan chair placed in the central aisle.

As will have been seen by a recent advertisement in our columns, the Office of Works have invited tenders for the construction of an additional story at the (old) General Post Office. That building was erected in 1825-29, from the designs of Sir Robert Smirke, R.A., in lieu of the old office in Lombard-street. It stands on the sites of St. Martin-le-Grand collegiate church, St. Leonard's, Foster-lane (not rebuilt after the Great Fire), the Dark Entry, and, going from north to south, Horseshoe-alley, Round-court, New-entrance, Mouldmakers-rents, Great and Little Dean's-courts, Three Crown-court, and George-street. In June, 1888, that part of St. Leonard's burial-ground which lay next west of the Money-Order Office, and abutted against the northern face of the City wall, was raised, and added to the graveyard of St. Eotolph's, Aldersgate. St. Leonard's is a small parish, being fairly co-terminous with the collegiate precincts. A link exists between the church of St. Martin, founded in 1056 by Ingelric, Earl of Essex, and his brother, Girard, and the Tower of London. The Dean of St. Martin's, temp. Edward III., was Secretary of the King's Treasury and Keeper of the Jewels in the Tower, and they then gave the name of St. Martin's to the old Brick Tower, wherein the jewels were kept. Another jewel-house was built, in 1842, after the fire; at present the regalia is deposited in Wakefield Tower.

FROM the *Oldham Chronicle* of the 1st inst. we learn that the Sanitary Committee of the Corporation of that Borough are very indignant at some remarks made by the Borough Coroner (Dr. Thomson), and endorsed by the verdict of the jury, at an inquest recently held on the body of a newly-born infant. The jury found that the death of the child was caused by the insanitary condition of the house in which it was born, and,—by implication, at any rate,—they placed the death of the child at the door of the Sanitary Authority. The Chairman of the Sanitary Committee having, at a subsequent meeting of that body, strongly repudiated the conclusions of the Coroner and his jury, and denied that the house in which the death occurred was in an especially insanitary condition, the Coroner (who is a medical man) deemed it to be his duty, in the public interest, to vindicate the proceedings of his court, and he therefore commissioned two engineers conversant with sanitary engineering (Mr. T. S. McCallum, C.E., and Mr. E. Codling, C.E., both of Manchester) to make a thorough inspection and examination of the house in question, which is situate in No. 1 Court, off John-street. The report of the two gentlemen named contains the following passages:—

"The Corporation officials and the owner of the property were advised of the proposed inspection. The house in question is a 'back-to-back' one. The

greypiece of the upper floor was found to be bricked up absolutely air-tight, thus preventing all possibility of through ventilation and the air of the rooms was very stagnant and vitiated; from the foulness of the air it was evident that in some parts of the house the air is never changed. This stinging up of a poisonous atmosphere is of itself bad, but any sewer gas finding its way into the house remains there, their being no through current of air to expel it. Back-to-back houses are now a generally recognised source of danger, and the Oldham Corporation should consider whether they ought not to condemn this class of property. The waste-pipe from the sink or slopstone was found to discharge over a gully trap outside. At the time of the inquest this gully was covered over with a flag, so that really it was not 'disconnected' at all. It was simply 'trapped,' which is quite another matter. Experience has frequently proved that under certain conditions of atmosphere, temperature, &c., sewer gas can pass through the seal of an ordinary trap; this is not mere theory, but the fact has been proved over and over again. This being so, it is clear that any sewer gas which might pass through the trap of Howcroft's house would have free access to the rooms, there to be inhaled by the occupants. The lead pipe from the sink to the gully has no trap upon it, so that even if no air from the public sewer passed the trap, the foul odour from the accumulated filth in the trap itself would be sucked into the house. Another strong objection to covering over the gully traps is that it is impossible to clean them. In this same court several of the gullies were found to have become choked in this way, with the result that the sewage matter has been overflowing into the surrounding subsoil.

In some cases it was evident that the filth had been for months running into and saturating the ground under the houses; one gully, at least, has been choked for nearly a year. In fact, the ground has really been acting as a cess-pool, and, of course, the foul gases are drawn into the houses. There is no option but to condemn the method used by the Corporation for dealing with the waste-pipes. The only safe way for this or any other class of property is to make the lead waste-pipe discharge in the open air over a trapped gully; the lead pipe ought also to be trapped. . . . A day or two before the inspection (and since the inquest) the gullies of the back-to-back houses in this court were ventilated to the open air by gratings; and it is so far satisfactory to note the admission thus made that this is the better method. On applying the smoke test to the drains of the court, numerous defects were found. The rain-pipes have no traps, and they allow foul air to escape at all the joints and at the eaves, close to the doors and windows of some of the houses, one of these pipes being against Howcroft's house. The smoke test demonstrated that these pipes are sources of danger as at present arranged. . . . At one end of the court (which is the most confined) there are two large gullies, without traps; there is also a sewer ventilating grid near the same point. The result is that enormous quantities of foul air from the sewers (and, of course, any disease germs that may be contained therein) escape at this point. . . . In testing the drains of the adjoining court, these were found open sewers. Some of the gullies there are not even trapped, and in one case the house was filled with smoke in less than two minutes; this proves that by far the larger part of the air supply to that house is sewer air. In another case the waste-pipe is connected direct to the drain without a trap of any kind."

The state of things revealed by this examination shows that the Sanitary Committee of Oldham have plenty of work before them, without wasting time in bandying personalities with the Coroner.

A BOOK on the monumental brasses of Lancashire and Cheshire, by Mr. James L. Thornely, is announced as shortly about to appear. The object will be to give not only illustrations of the brasses, but biographical sketches of the persons commemorated. The brasses which will be illustrated, it is stated, have mostly not been before published.

THE Exhibition at the New Gallery is not a very remarkable or interesting one, and seems to have been prompted rather by the desire to have an exhibition than by the fact of having anything special to exhibit. Some of the best works there, such as Mr. Tadema's "Hadrian" have been exhibited in London not very long since; and though there are a certain number of works worth looking at, there is a large amount of mediocrity. There is however a large decorative painting by Mr. Burne Jones which is worth attention, a design for the mosaic for the Church of St.

Paul in Rome; and it is a pleasure to see Mr. Mullins's fine clay sketch for his pediment for the Harris Museum at Preston. It is to be wished English sculptors had more commissions of this kind, especially if they were all carried out as ably as this one.

ARCHITECTURE: AN ART, A SCIENCE, AND A PROFESSION.

BY PROFESSOR T. ROGER SMITH.

THE title of this lecture* bears, as you will most of you recognise, a suggestively close likeness to a phrase which was used as the watchword of a recent newspaper controversy. It is not my wish to attempt to revive that controversy. It is not in my power to say anything about a more serious statement of views in a forthcoming volume which is not yet given to the public. But things have been written and published which, partly perhaps from their indistinctness, have left, or are liable to leave, the impression that there is a necessary difference between architecture as an art and architecture as a profession or as a science. I propose, therefore, this evening simply to state a few obvious truths about the nature of that profession on which you gentlemen are about to embark. In doing so I shall unavoidably have to repeat much that has been said by others. The excuse must simply be that it is necessary to say things which have been said elsewhere, in order to render my statement complete. Here, in this college, where architecture is one of the subjects taught and studied, it appears to me that at the present juncture a plain, definite statement of my views, if not imperatively called for, is at least very timely, and, if I must unavoidably go over ground which has been gone over before, I will at least endeavour to clothe the old truths in my own language.

It is not always advisable in a public address to lay down at starting the precise course which it is intended to take. There is an advantage, at least sometimes, in allowing that course to develop itself, without its being possible quite to anticipate what it will be; but to-night, for clearness' sake, I will at starting define exactly the objects in view. First, then, we will consider what is an art; we will examine the nature of an architect's work, and I will endeavour to show that architecture is justly an art. We will then consider what is a science, and will see in what respects architecture is a science. We will thirdly consider a profession, and I will show you that the serious exercise of the art and science of architecture constitutes a profession. You will, perhaps, by this time see that the drift of the whole lies in the one short word, *and*. That wise fool, Touchstone, says that "there is much virtue in your *if*." At times there is much in your *and*, so I have ventured to substitute for an *or*, which insinuates doubts that I venture to call mistaken, the other conjunction which is meant to imply that there is no doubt at all. There will only be time at the close to allude in the briefest manner to your *preparation* for the exercise of this profession, by the pursuit of such studies as form the occasion of our meeting here this evening, and in other ways; but if I can draw for you a definite picture of what an architect has to do and ought to be, it ought, I think, to be helpful to students who desire to become architects, and, as I hope and believe, good ones.

An art has been defined as "the power of doing something not taught by nature and instinct." Obviously, no natural gift, no skill gained unconsciously and in a natural way is an art. To take a very simple illustration, riding and swimming are often spoken of as arts because we all acquire the power consciously and laboriously—not so walking or running, which may be said to be natural. "Art is not a nature." The word *arts* in the plural has an extremely extended significance, and may be used to cover all the kinds of learning and knowledge that are called liberal pursuits. The word *art*, on the other hand, has often a narrow meaning, and is limited to objects of beauty. Art in this sense is a word which has been at late years on everyone's tongue. More correctly, this sort of art is called fine art, but we usually now refer to painting, sculpture, music, architecture, and the related pursuits as

* Opening Lecture of the Session 1892-3 at University College, London, delivered on Thursday evening October 6.

pre-eminently the arts. This, however, is not strictly accurate. When we talk of an art it may or may not imply the possession and use of learning and knowledge, and it may or may not imply the exercise of trained and cultivated taste and the pursuit of beauty; but it always means a skill that does not come by nature. We talk of the art of the potter, the weaver, the navigator, the engraver, and, rising to a higher plane, we recognise the art of surgery, the art of war, the art of advocacy; but when what is the prime mover is no longer skill, but either learning, experience, money, or passion, the pursuit ceases to be thought of as an art. We do not, for example, talk of the art of a student, or an agriculturist, or a merchant, or a politician, although each of these must develop some skill in the exercise of other powers.

Though there be a distinction between an art as thus described and a fine art demanding cultivated taste as well as skill, the relation between the two is still very intimate; the links, for example, which connect the art of the sculptor with that of the jeweller, or even the potter, are close ones. There must be the same highly-trained manual skill, and the same intimate knowledge of the materials used. The same clear and definite perception of the aim to be attained is needed for success in either. In each of the two industrial arts I have named, pottery and the goldsmith's craft, the production of objects of beauty is also an aim of the artisan, and if in addition the pursuits of the sculptor be of a higher, more arduous, and more intellectual quality, that difference is more in degree than in kind. There is, of course, between most of what are sometimes called the industrial arts, taken as a whole, and the fine arts, a difference which is conspicuous enough, but it is not always recognised that the whole of the arts are connected together to a remarkable degree by the fact that trained skill is in each case indispensable to those who would pursue them, and that there is not often a hard-and-fast boundary line distinguishing the one from the other.

He that pursues an industrial art is called an artisan; he that pursues a fine art is called an artist; but many an artisan is an artist as well. The smith who hammers out a bit of red-hot iron into a horse shoe, and replaces the one your horse has cast, is, perhaps, only an artisan. Yet, while you wait and watch him you are filled with admiration at the deftness, speed, and accuracy with which the work is done. Perhaps the same man can beat out for you a final of wrought-iron round which he twines the vine leaf or the olive, and into which he infuses grace, beauty, charm. That man is then the artist, but his manual skill is an essential, integral part of his equipment for his art, although the taste, the feeling for beauty, and the knowledge of how to impart beauty to what was an hour ago a dull, inert mass of cold iron, is the highest development of his qualification; needless, however, without the other homelier power, and in some sort, as I take it, rather a development of it than a distinct gift.

Is architecture an art? And, if so, is it a merely industrial art? Is it one of those nobler arts,—like surgery, for example,—which stand out prominently as dignified, and yet may have nothing to do with taste and beauty, or is it a fine art, like the pursuits of the musician or the painter? Architecture obviously does not resemble arts such as are generally called industrial. Architecture is not an industry. It, however, has much in common with what I have described as the nobler arts; it has also much in it of the fine arts. Let us for a moment consider how much, and let us with this object examine the nature of an architect's work.

The architect has to exercise trained skill at every step, and he depends upon that skill for his success. To begin at the beginning, it is not a natural gift which enables him to grasp the requirements in the case of any intended building,—this, which must be done as the first step, is only possible after very considerable experience and training, yet if it be not clear to the architect what the requirements are which he has to provide for, his work is compromised at the start.

Again, the power of grasping the nature of the site which a building is to occupy,—selecting the exact position, and blending or contrasting the intended building with its surroundings, is an acquired skill; in short, an art in itself.

Again, the skill which can rapidly and surely

contrive and plan a scheme that will meet the requirements when the latter are clearly understood, and will fit the site, is an acquired aptitude, and one that needs cultivation and constant practice to develop it, and without which the architect is unable to produce a building fit for its purpose.

When the architect proceeds to design his building, he begins by planning it,—that is to say, designing and arranging the shape and size of the floor or floors on which the affairs which the building is for can be most conveniently transacted, together with the walls to enclose them, the openings for light and access, and, in any complicated plan, the communications. While this is being done, however, other considerations must be present to the mind. The shape or shapes given to the building must be such as can receive a suitable roof, and such that out of them shall naturally grow an exterior and interior with good architectural character. It is impossible to exaggerate the importance of the plan as a factor in the design, and only by trained skill can the architect embrace these various and often conflicting needs at the same time, and combine and contrast, change and recast one part after another till he has achieved that triumph of technical skill, a good plan.

We have said that the appearance of the building has to be borne in mind from the first, and as the planning proceeds, the designing of the exterior and interior must be taken up and proceeded with; and here a skill and a taste bred only of cultivated training, practice, study, effort, and some spark of genius, or, at least, some treasure of talent, is called for. With main forms shapely, well-proportioned, harmonious where a quiet effect is right, or contrasted where brilliancy is needed; with features each in its place, and each itself good; and with mouldings, enrichments, ornaments, and colour, each studied and each characteristic,—the architect must gradually build upon paper a series of elevations and sections which his skill enables him to make, beauty, and such dignity, or grace, or other quality as best fits its nature and its site.

Another claim on that skilled capacity which makes up the art of the architect, and one, perhaps, as difficult to comply with as any, is made by the financial question. Rarely has the architect *carte blanche*; rather, as a rule, he is closely limited by a fixed amount to be expended, which may not be adequate to enable his ideas to be carried out. In most cases it is essential to success that strict economy be observed, by which I do not mean mere cheapness, but a vigilant eye to keep out everything in the least superfluous, and a careful adjustment of the entire project to the funds at the architect's disposal. In this respect our work is placed under conditions with which the painter has nothing to do, but which are not dissimilar to those governing the sculptor's work. They press often very heavily on the architect, and yet ability to conform to them is one of the parts of our art most imperatively necessary. To put the case in the fewest words, the architect is spending it like a careful trustee. He is bound to spend able at a very early stage to foresee what the cost of carrying out his design when it has been matured will be, and the success of the undertaking not a little rests upon his success in doing so.

Another peculiarity inseparable from the position of the architect, and one of the difficulties besetting the exercise of his art, is that he has to build through others. He cannot execute with his own hands the works which he designs and produces. An army of carpenters and joiners, masons and bricklayers, are at work erecting the building, each not unlikely to fall into mistakes and mar as well as make. The architect must supply such plans, such specifications, and such supervision that it shall be easier to go right than to go wrong, and that the many hands engaged may work to one end. I quite admit that from one point of view the modern system of management by which in most parts of England one contractor directs many trades diminishes the difficulty which I have described compared with what it was at the beginning of the century; but if it makes it easier to direct a miscellaneous body of operatives, this practice introduces a new and a not less serious possibility of difficulty of a different sort. The interest of the contractor must weigh with him; and may tell adversely

if doing the work badly be to his interest, and be not foreign to his principles. In such a case it depends upon vigilance, which may often be eluded, whether cheapness may not take the place of economy in a manner detrimental to the work.

In short, dealing with men, with contractors, foremen, artisans, clerks of works, and last, but not least, with employers, committees, and official persons, is a part of his art in which the architect requires to be skilled. Fortunately for beginners, and indeed for us all, a good routine exists, and scrupulous attention to it will enable a reasonably sagacious man to avoid many of the difficulties; but even to gain a familiarity with that routine is part of the requisite training.

I have yet to allude to one of the most interesting, as well as the most important, branches of an architect's work. I allude to his supervision of his building during its erection. The methods pursued at the present day require a great deal of foresight to be exercised. We build our buildings on paper complete, long before we build them in bricks and mortar, but when the paper work is done the exercise of the architect's skill is only begun. The superintendence of a work consists in part in watching the materials, and the putting of them together to see that the one is sound and the other workmanlike; but it means also watching the architectural quality of the work, as it gradually emerges from the ground and takes shape, in order to see that that shape is what it ought to be, and within limits (to which I will allude directly) to better it. We will select one feature, the mouldings, as an illustration of what should be more or less done for every part. When there are mouldings, either in the exterior or interior, the architect should see a specimen of each important moulding, or group of mouldings, executed in the same material and placed at the same height from the eye as is intended. If he is master of that of which he sees a specimen will do its work as a factor in the artistic quality of the building, and if it will not to know how to modify it. What it required as to mouldings is required as to every other element of the building, and a skilled and vigilant architect can do much to perfect the quality of his executed work by minute attention to details as they go on.

Beyond this comes the question of improvements. Few minds cease working at any stage short of the end of an undertaking; and the architect or his employer can often see how to modify for the better a building which is in progress. This is sometimes a misfortune, as well as an advantage, and part of the architect's art is to know when not to change, and when he had better change his work as it goes on. Nothing connected with building is more full of risk; and a most unfortunate quality of mind is that fluctuating taste which before a work is well begun desires to change it in important particulars. Over supervision is also a defect, and one part, not an inconsiderable part, of the art of superintending a building is to be able to let well alone.

It may be objected that in this description I have mixed up things which everyone would admit to be *art* with others to which some would desire to give another name. But I reply that every part of what has been just described is essential. If a building is designed and carried out without any regard to the architectural qualities which it ought to have, if it is vulgar, unpleasing, ugly, we all recognise that an essential point is missed; but I maintain that if it is badly planned, or carried out defectively or profusely, the architect has equally missed an essential of success in his art. And let me add that the quality which we are about to consider under the name of science must lie at the root of the art, or the result must be incomplete,—not to say imperfect.

Architecture as a Science.

Science means knowledge. A science is the knowledge possessed by learned men on any one subject. We talk of the science of heat, and we mean all that is known about heat. The science of chemistry similarly means all that is known about chemistry. A good deal of that which is now known consists in the laws that govern phenomena, as well as in bare facts, and under existing circumstances, when the boundaries of knowledge are being extended in every direction, a good deal more of the time of scientific men is spent in

research than in dealing with known and established facts. These two ideas, however, the idea of research and that of the study of natural laws, are what one may call secondary and added notions. The primary and simple meaning of a science is the sum of that which is known and knowable about any great subject.

There are various directions in which the architect has to accumulate knowledge, and various sources which contribute to the science of architecture. The first of these is construction. Skill in contrivance, facility in design, must rest upon and spring out of sound structure. The architect must know out of what materials his building is to be made, and how to deal with them; what is necessary for stability, what for solidity, what for durability; what are the defects or the bad qualities of each material, and what is its special excellence; and how the defects are to be remedied and the good qualities utilised. He requires to know how building is done, and that in various localities and with various arrangements; and he should be abreast of all the improvements of recent years,—the new materials, new modes of manufacture, and new possibilities; but while he is to be aware of what is newest, he must also be master of what long experience has established. In short, *building* is the architect's business, and, unless a knowledge of building which is at once accurate and extensive forms part of his equipment, he will do badly.

This is the more important because all the noble qualities which architecture can impart to mere building grow out of sound construction. Such fine features as the arch, the dome, the vault are only pleasing because they are structurally part of the proper constituents of a building, and proclaim themselves such. When the eye, indeed, once perceives that a feature, even if richly decorated, is not structural, it loses more than half its charm. Few travellers, for example, can have failed to feel keen disappointment when they found out that the gables of many Italian churches were shams, not having any relation to the outline of the wide roof which they conceal; and were there any point from which it were possible to perceive that the exaggerated parapet of St. Paul's suggests to the spectator a storey which does not exist, I think few would fail to resent the means by which a very noble appearance has been obtained.

At the present day the introduction of steel and iron into buildings is the great novelty in construction, and no architect can afford to be unfamiliar with the qualities of these materials, or to be unprepared for the necessity of employing them should it arise. The extensive possibilities opened out by the use of terracotta, the various ways in which Portland cement has rendered strong and stable building more easy than before, and the many varieties of tiles obtainable, may be taken as less capital examples of modern methods which must be mastered.

I spoke of various directions in which the science of architecture has been developed. Construction is one, sanitation is another. Not only should the architect be able to design and calculate his own beams and stanchions, he must also be able to arrange the drains, the water-supply, the heating, lighting, and ventilating of his buildings, and that in a manner such as to be fairly abreast of modern practice in this respect. I do not consider this a less essential branch of the science,—or knowledge,—which an architect must acquire and make use of than construction, and in nothing affecting a building are there so many recent discoveries to record.

A further branch of the knowledge for which I am pleading, and one constantly ignored, deserves mention. I refer to the transmission of sound. How often do we find a fine church in which no one can preach so as to be heard; a court of justice in which the keenest ear can hardly catch half the proceedings; a public hall where no speaker can escape an echo? Now, it is not caprice and chance which occasions these failures, though it soothes our self-esteem for us to say so when we have failed. The truth is that a certain amount of attention to what is known about sound, and of keen observation of buildings already erected, would have rendered the architects and their employers an inestimable service as showing what was likely to lead to failure, and how to avoid it.

The last branches of the science of archi-

ture to which it is necessary to direct your attention is of a different nature to the ones just alluded to. A competent knowledge of some at least of the forms used in architectural design, including under the word forms general masses, features, mouldings, and enrichments, is quite indispensable. When I say a competent knowledge of certain forms, I mean a knowledge so thorough and complete that the architect can use those forms with perfect ease and precision, and knows them as familiarly as he knows the size of a brick or a line, or as a musician knows the notes of the scale. I said a competent knowledge of *some* of these forms, and probably no man has known or can ever know them all, nor is it necessary. Enough to enable a man to design in one style and to make the detail drawings and profiles for the building is the minimum. How much more is desirable I dare not attempt to say. Possibly the most successful designers have not gone beyond one style; at any rate, the best designs that the world has seen belong to ages when only one style was known and followed in one place. He who would limit himself to one style, however, should at least know every part of that style thoroughly; and, let me add, he will be helped by that knowledge if he study others.

It seems, however, to the last degree desirable at the present day that an architect should have a general knowledge of the past art, at least of Europe, her principal buildings, and the growth and decay of various styles of architecture. Without this he is ignorant of what must often be suggestive and always deeply interesting, and he can hardly be prepared for the miscellaneous demands of the present day.

The sort of knowledge of architectural forms and features to which I refer can hardly be obtained except by measuring and drawing existing buildings themselves. The groundwork of it may be laid by a student while working on another architect's buildings; but, as a rule, a thorough, accurate, serviceable mastery of one style, such as enables an architect to deal with it as the clothing of his architectural ideas is got nowhere and nowhere except by definite study of existing work, certainly not from photographs, and only partly from drawings, engravings, or books. A knowledge of the history of the art, on the other hand, is obtainable best in the class-room and the library.

Architecture as a Profession.

We will now try to form an idea of what is meant by a profession; and, as is not infrequently the case, we may perhaps be aided by looking back a little to the days of our forefathers, when life was less complicated than it is now. A hundred and fifty years ago four professions, and, I think I may safely say four only, were generally recognised, though even then one other, to which I will allude directly, might be added. The Services, the Church, the Law, and Medicine are the four. If for a moment we consider what distinguishes these pursuits, we shall have made out the general idea of a profession.

First, in each of them there is the idea of some special personal cultivated skill; in other words, the mastery of an art. Take the Services,—for either of them a man must claim to be skilled in something. It needs a long training to sail a man-of-war, to carry her safely through a storm, to go through a sea-fight with credit and success; nor is it less a feat of trained skill to conduct a campaign, command an army, a regiment, or even a company. In short, seamanship is an art. There is an art of war. The clergyman's position implied,—and to a large extent does so still,—a university education, and a degree, and some mastery of the art of public speaking. That the practice of the Law requires special training and skill, and is indeed an art, is as notorious as that the same is true of Medicine. The first qualification for a profession is then what is meant by the title. The professional man *professes* that he is master of an art; in other words, skilled in a certain pursuit.

Next please note that each of these callings is pursued on behalf of some one else. The soldier and the sailor fight for the other people who make up what we call "their country." The doctor gives advice to his patient or aids him by his surgical skill, and sometimes saves his life, often restores his health. The lawyer conducts his law business for clients and protects their property and interests. The cleric

spends his life ministering to the wants of his parish or his diocese.

The respect in which the professions were and are held springs from these two qualifications. A man who can do something difficult and who can accomplish for us what we cannot do for ourselves is more or less looked up to, and the station that he occupies is held to be honourable. Nor is this honour very seriously impaired, if at all, by the third point about a profession, namely, that it is set once the means of living and also the way of life of him who practises it. The idea that a professional man is to be paid is so deeply fixed in people's minds that it is quite customary to use the phrase, "I wish to consult you professionally," in order to convey the meaning, "I want your advice, and am prepared to pay for it." The man who does the same sort of work that a professional man does without making his living by it is discredited by the epithet amateur, which always carries with it a kind of sense of the second-rate, and nowhere more so than when building is spoken of.

It is necessary to add that in many cases the practice of a profession includes more or less of what is known as business, that is to say, of acquaintance with and exercise of the methods by which serious affairs involving property and money, loss and gain, should be conducted. Every pursuit by which a man seeks to make his living requires some business habits and aptitude of him, but in many professions the very nature of the work done calls for business training and talent. Think of the large pecuniary interests which an engineer has to deal with, or an actuary, or a barrister, and you will recognise that many sorts of professional men are bound to be men of business.

Lastly, a profession is the mode of life of the man who practises it, as well as his means of living. If he be not, at least for a period of his life, given up to it, and absorbed in it, and devoted to it, not only is his success in it, and very problematical, but his claim to any distinction it can confer is doubtful. We have thus arrived at three characteristics of a profession,—that it implies the mastery of an art, and of the knowledge needful for its exercise; that it is exerted on behalf of others; that sometimes it is of the nature of a business, and that it is paid. A certain precision might, perhaps, be added to our notions by some negative characteristics. It is not commerce, it is not manufacture, it is not agriculture, and it must not be trivial or mean in the objects to which it summons the professional man to devote his life.

Just as, had I gone further back, we might have come upon a period when in Europe there were but two recognised professions, the Church and the Army, so by coming nearer to our own time, with the rapid increase in wealth, population, activity, and knowledge which the present century has witnessed, we find one calling after another conforming to the criterion given above and so added to the list of recognised professions. For example, at least from the days of Reynolds and the establishment of the Royal Academy, a painter has been recognised as a professional man. Since the days of the elder Brunel and Smeaton, the calling of a civil engineer has become a definite profession, and now the list of professions includes literature, education, the fine arts, and not a few of the applications of science, such as the work of the electrician, the consulting chemist, the metallurgist, and many others.

But before the days of the earliest recognition of scientific, or even of purely artistic professions in England, I think we have evidence that the architect was a recognised professional man. All that we know about the career and standing of Imigo Jones, of Sir Christopher Wren, of Sir John Vanbrugh, and their colleagues, seems to show that they must have held a position of the same sort as was accorded to the physician or the highly-placed clergyman of the same date, and certainly that they worked as a professional man does at the present day. So that in England it was the very earliest profession (next to the famous four) to receive general recognition.

However that may be, architecture as practised, and as you will have to practise it, is a profession with all the marks of one. That it includes the mastery of an art, and the possession of the knowledge necessary to the exercise of that art, I have endeavoured to show. It is exercised on behalf of a client; it is exercised as the pursuit of a lifetime and as is exercised

living. It does not relate to mean or unimportant things, and it is not commercial, or agricultural, or manufacturing; but it does require business habits and an aptitude for transacting affairs.

If, then, you are to become architects, you are to embrace architecture as the one chief work of your lives, and to fit yourselves for the practice of architecture you are to master alike the art, the science, and the profession.

And on no other terms can architecture be done, because architecture is building; and building, though no mystery, involves so much that is technical in its artistic, its scientific, and even its business aspect, that in no other way than by becoming a professional architect, and devoting the time and energy which the profession claims, and attaining the skill and acquiring the knowledge which the profession demands, can you hope to execute even an approach to good architectural work.

Architectural Training.

In a lecture which is intended to open a course of instruction in architecture it will not seem out of place if, having arrived at what you gentlemen have to put before you as your aim, I conclude by a few words devoted to showing how you are to attain that aim.

First,—and on this I am disposed to lay more stress than ever—for the practical part of the art, using that phrase to signify chiefly skill and experience, and business aptitude, you must look to the practice of the offices where you work as pupils or assistants. Architecture is a very practical profession, and it is of no use to expect that you can learn how to conduct it by attending classes or reading books, or in any other way than by taking as large a share as you can in the work of some office, and watching keenly and observantly all that goes on there. In your office-life nothing is too insignificant or apparently trivial to be unworthy your notice. At the same time, your wise course is to do your very utmost to qualify yourselves for the more difficult parts of the work. Always welcome a difficulty. If a hard master it is an invaluable one.

Beyond that phase of the art which you learn in the way I have just indicated there is the science of architecture, of which you can learn little in an office, but much in classes and from books.

And in acquiring the science always, from the first, give prominence to that side of it which has to do with architecture as a fine art. The nature of materials and how to use them is a matter more easily mastered than the nature of architectural forms and features, mouldings and enrichments, and if you begin with construction and neglect the other sorts of knowledge, you will find them less easy to take than if you go the other way to work.

Begin by learning to draw, and to draw well, and then exercise yourselves continuously in drawing architectural objects and other objects partly from other drawings, but as far as possible from existing buildings and from plaster-casts, and you will gradually acquire that sort of knowledge and that sort of skill which are at once the most valuable and the most difficult.

Early try to get a mastery of perspective, and keep up and extend any skill you have in drawing the figure and in landscape.

In addition to this knowledge of forms, which is largely to be learned by the use of the pencil, gain a knowledge of construction, of materials, and putting them together, and of all the scientific and practical subjects which bear upon your future career. In this, of course, classes, lectures, and books are indispensable, but a good deal can be learned by an observant man from the working and other drawings in progress in the office where he is employed, and more, and that of the most valuable description, on the scaffold or in the workshop.

Every student should learn also the history of architecture, without a knowledge of which, indeed, it is all but impossible to understand the forms and meaning of any important part of a building.

As knowledge grows, and students become familiar with the way in which buildings are shown geometrically, it is very desirable for them to try their hand at designing, *i.e.*, putting together the materials of an artistic and practical sort which they have begun to accumulate in their memory. In this way the rudiments of the highest part of architectural art, namely, architectural fine art, are begun to be mastered. The most valuable school for the study of

this, the highest part of architecture, is, beyond doubt, the study of existing buildings. Observing them is of some use, sketching them is of more use; most useful is measuring and carefully drawing out good examples, and to this pursuit various shorter periods of Continental travel and study may be usefully allotted, but certainly one good long tour. This is settling down to begin practice, and this, more becoming an artist.

I take it for granted that any student now seriously proposing to become an architect will set before him the passing of the Examinations established by the Institute as part of the career which, as a beginner, he must look forward to. Remember that these and the certificates they earn, like all examinations and honorary distinctions, are valuable as means—not as ends. They set before you objects of study. They supply a means of testing what progress you have made, and they supply what is often invaluable, a stimulus; but the object of a student of architecture is to make himself an architect, and that object is not necessarily attained when the first, or the second, or the final examination is passed; nor is it wise to regulate your studies only by the question of whether they will or will not count for marks at Conduit-street. There is not much that will help a real architect in his work which will not also help a candidate in the examination, and perhaps the converse might have been even more strongly put, namely, that there is nothing which will assist a candidate in the examination that will not be of service to him as an architect, were there no such thing as a crammer. Knowledge that is crammed is like food that is bolted, it is not assimilated, not digested, and so cannot nourish.

It may not be out of place to point out shortly what subjects can be studied in this college. The history of architecture looked at as a fine art forms the subject of one of my two principal courses. I endeavour to demonstrate how one style grew out of another and matured and decayed, and in what the architectural quality of each consisted. I also attempt a criticism of individual buildings, and a somewhat close investigation into the details of some of those styles of architecture which are most highly developed. Materials and construction form the subject of another course of my lectures, and here each important building material is taken up in turn, its qualities, excellences, and defects are set forth, and the use to be made of it in building is explained. A third course, on the practice of architecture as a profession, touches on the routine of building operations, the laws relating to building, and similar matters as to which an architect should be informed. I have much now established in this College, at the expense of the Carpenters' Company, two evening classes for drawing—one for architectural drawing, and the other for the drawing of building construction, and these, I hope as they become generally known, will be of great service to many students, for they are calculated both to afford knowledge and to give practice in draughtsmanship. They are under the direct care of two extremely competent gentlemen, as well as under my own general supervision, and the City Company, which has established them, has enabled us to make the fees extremely moderate. These classes all meet at hours calculated to suit the convenience of students engaged in offices during the day.

Various classes in this College also afford opportunities for the study of many subjects which it is well for an architect to know, such as geometry, physics, chemistry, geology, the technology of building materials, sanitary science, land surveying, and, in another branch, architectural ornament.

These, however, are not classes which meet at hours convenient for students who are engaged during the day. For those who have the entire command of their time a very complete to becoming an architect's pupil, has been arranged at an inclusive fee.

I may add, for the information of students who are uncertain what classes to attend, that it is open to them to attend any class for one or two lectures as visitors, and to consult with me after either lecture as to what class to take.

To those who may be coming here this session to study for the profession of architecture I promise a hearty welcome, and that

no pains shall be spared to make their work instructive, and, let me add, interesting to them; and not only to those students, but to all who are preparing for the practice of the profession whose nature and scope I have tried to set forth. I cordially offer sincere congratulations, because the pursuit in which they are about to engage, if laborious and often trying, is certainly fit to occupy the best efforts of the best men.

It is no mean, or slight, or even passing aim that the architect pursues. His works, though by the side of natural objects they may seem very transitory, are yet, as man's work goes, enduring, stable, solid. To build well, fittingly, and nobly is an occupation worthy of the best energies of a capable man. Fortune is not easily attained by the architect; and the very highest rewards of professional life, equal for example to the Bench or the Cabinet, are not attainable by him, or, indeed, by the followers of all this, architecture places within an able man's reach enough to justify any reasonable ambition. There is in it scope for the exercise of very varied powers exerted for the attainment of objects more useful to mankind than those which the bulk of them follow.

The work to be done, and the duties to be discharged, in the successful conduct and completion of a building operation, from its first conception to the final settlement, are sufficiently arduous and varied; and the man who has honourably and satisfactorily carried out such operations for a period of years, and has been able (as I hope each one of you will be able) to give to his buildings some of those qualities which raise them to the higher plane of architectural fine-art will not have lived in vain.

Those whose aim is the highest part of the architect's art will find the field is singularly open to genius and even talent. In no other profession are there such opportunities offered to young men of real power as the system of open competition for public buildings places within the reach of architects. However beet that system may be with drawbacks of various kinds, it does open a door to success, the like of which does not, so far as I know, exist in any other calling; and in other ways opportunities do not fall to present themselves to most men who can afford to wait for them. It is the ability and the energy to grasp them which are oftenest wanting. Believe me, in so rich a country as England if any one of you proves to be another Wren, another Pugin, or another Barry, it will be strange, indeed, if he has not ample scope, and the chance of adding to the number of those works of art which contribute more than ought else to the dignity of a nation. The most justly prized of all the works of art in our country are our cathedrals, with their splendid conception, daring construction, overpowering dignity, and lovely grace; and to build a cathedral seems a chance past hoping for. Yet the four men in our own century best able to vie with the architects of old have had the opportunity at Hamburg, at Cork, at Dublin, and at Truro of distinguishing themselves as architects of cathedrals.

I do not wish to conceal from you that the profession is laborious, and that its great prizes fall to very few; but I maintain that its more modest rewards are within the reach of many; and if one among you really becomes equal to the performance of some special feat of architecture, I feel sure that—if not the nineteenth—the coming twentieth century will afford him the occasion for distinguishing himself, and adding to the adornment of his country.

NEW CHURCH, BRADFORD.—The dedication-stone of the new church for Bradford, to be called St. Clement's, was laid on the 24th ult. The site is at the junction of Glipin-street and Barkerend-road. The building will be Perpendicular Gothic in style. The principal entrances will be at the west end, and the total length of the edifice extending along Barkerend-road will be 150 ft., and the total breadth 74 ft. At the north-west corner will be a turret with spire, the height being 83 ft. The height from floor-line to roof will be 50 ft. The roof will be open-timbered and decorated. The altar is to be of marble, and a sedilia and piscina will be provided. The chancel will be 44 ft. long and 22 ft. wide, and there will be an east window of five lights. All the pillars of the aisle will be of red stone from Cumberland. The church will have open seats, and will provide accommodation for 600 or 700. Messrs. Wheeler Bros., of Reading, Berkshire, are the contractors, and the architect is Mr. E. P. Warren, of Westminster.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS: MEETING IN BELFAST.

A MEETING of the members of the Incorporated Association of Municipal and County Engineers was held at Belfast on Friday and Saturday, September 23 and 24. This is the second meeting held by the Association in Ireland, and like the Dublin meeting of the previous year, the Belfast gathering was a pronounced success, viewed either from a professional or social standpoint. Amongst the members attending the meeting were Mr. J. Cartwright, of Bury, President; Messrs. T. De Courcy Meade, Hornsey; J. T. Bays, West Bromwich; J. C. Bretland, Belfast; A. M. Fowler, Manchester; W. G. Scoones, Maidstone; R. H. Dorman, Armagh; S. Stead, Harrogate; J. T. Hawkins, Somerset; W. H. Savage, East Ham; A. Greenwood, Tordorden; J. B. McCallum, Blackburn; J. H. Shelton, Antrim; R. N. Somerville, Cavan; J. H. Shellington, Lurgan; R. B. Sanders, King's County; P. Dodds, Southend-on-Sea; M. S. Gaultier, Fleetwood; W. H. Hopkinson, Keighley; H. P. Cowan, Antrim; J. P. Spencer, Tynemouth; J. Perry, Galway; W. J. Robinson, Londonderry; L. L. Macassay, Belfast; C. C. Smith, Dalton-in-Furness; R. Cartwright, jun., Bury; T. Cole, Westminster (Secretary), &c. The visitors included the Mayor of Bury (Councillor Ascroft); Alderman Dr. Parks, Bury; Dr. Mauly, J.P., West Bromwich; and others.

The members attending the meeting assembled at the Great Northern Railway Station on Friday morning, where they were met by Mr. R. Corry, Chairman of the County Waterworks Commissioners, and Mr. J. C. Bretland, City Surveyor, and were conveyed in cars to the extensive filter-beds and reservoir of the Belfast Waterworks at Stoneyford. On arrival at the filter-beds, which are capable of filtering 3,500,000 gallons of water daily, the works were thoroughly examined. There are three extensive filter-beds, which are so constructed that two of the three beds are sufficient to properly filter the water passing through the filtering medium, thus keeping one in reserve for cleansing. This has been found in working to be a most useful reserve, as the water is peaty, and would otherwise soon choke up the beds. The filtering medium has a depth of 5 ft. 6 in., and consists of stone, gravel, and a top layer of fine sea-sand; 500 gallons of water per square yard are passed through the filters every twenty-four hours. The cleansing of the sand is most thorough, and was generally commended.

From the filter-beds the party drove to the supply-reservoir at Stoneyford, where they were entertained at luncheon by the Waterworks Commissioners, Mr. Corry presiding. After luncheon, the Chairman proposed "Success to the Association of Municipal and County Engineers." He said he was very much pleased indeed to have the opportunity of bidding them a hearty welcome to Belfast, and he hoped their visit to the waterworks might be useful to some of the engineers attending the meeting. He knew they had in Belfast taken the opportunity of visiting other places where works had been in course of construction, and they had returned home carrying with them information that was useful to the community they served. He thought there were no more responsible body of men in the kingdom than the engineers connected with the various Municipal Corporations, for to a great extent the health of the community was in their hands. A great deal depended upon their skill to counteract the possibility of epidemics occurring. Mr. Cartwright, President of the Association, in responding, said he desired, on behalf of the Association, to thank Mr. Corry, not only for the hospitality they had received, but for the very kind words he had spoken as to the responsibilities devolving upon Municipal Engineers. He was personally pleased that the experience and knowledge of Municipal Engineers were extending, and he believed that experience and knowledge would fit them to cope with any epidemic if occasion should unfortunately arise.

After an inspection of the extensive reservoir at Stoneyford the party returned by cars to Belfast. In the evening the members attending the meeting dined together at Thompson's Restaurant, Donegal-place, and were subsequently received by the Lord Mayor (Sir T.

Dixon) at a conversation given in the Queen's College, at which 600 guests were present.

The proceedings of the meeting of the Association were resumed in the Council-chamber of the Municipal Buildings on Saturday morning, September 24, under the presidency of Mr. J. Cartwright, C.E., of Bury.

On the proposition of Mr. J. C. Bretland, C.E., of Belfast, seconded by Mr. R. N. Somerville, of County Cavan, Mr. R. H. Dorman, County Surveyor of Armagh, was re-elected Honorary Secretary of the Association for Ireland.

Mr. J. C. Bretland, C.E., City Surveyor of Belfast, then read a paper on

The Progress of Municipal Affairs in Belfast.

He said: It has been suggested that some information regarding the progress of municipal affairs in this city would be an appropriate contribution from the writer on the present occasion, and, gauging the interest taken on the part of this Association by the number of its members present to-day, the author ventures to hope that some information on this subject would be acceptable. The following statistics show the unusually rapid rate at which Belfast has progressed for many years back and the great strain that has been placed on those in authority in the city to keep pace with its development. Belfast comprises an area of 6,805 acres, 4,322 being in the County Antrim, and 1,670 in the County Down, 813 acres being tideway. The municipal rates collected during the year 1890 amounted to about 137,119*l.*, and during the year 1891 about 144,363*l.* The number of buildings situate within the city during the last three decades were as follows:—1861, 18,375; 1871, 31,645; 1881, 43,790; 1891, 57,540.

The number of new streets laid out, paved, and sewered at the cost of the owners of property since the passing of the Belfast Improvement Act of 1865, is 1,618.

The following shows statistics of population included in the municipal area from the census returns:—1831, 48,224; 1841, 75,308; 1851, 100,301; 1861, 120,777; 1871, 174,412; 1881, 208,122; 1891, 255,235.

The valuation of the city in 1892 was 738,583*l.*

The indebtedness of the Corporation of Belfast at the present time is 985,544*l.*

The following table shows the death-rate of Belfast during the last few years:—1881, 23.6; 1882, 25.1; 1883, 25.8; 1884, 22.7; 1885, 27.1; 1886, 22.5; 1887, 24.3; 1888, 23.7; 1889, 23.6; 1890, 26.7; 1891, 25.5.

It is to be regretted that this table does not show favorably in comparison with some other large cities. The fact that the greater portion of Belfast is barely above high-water level, and the peculiar nature of the work performed in heated and humid factories by thousands of workers, has no doubt a tendency to keep the death-rate somewhat high. It is confidently hoped and believed, however, that the sanitary improvements now being carried out by the Corporation may soon bring in their wake a reduction of mortality.

Queen's Bridge.—In 1855 the matter of the widening of Queen's Bridge, the chief connecting link between the Counties of Antrim and Down, was forced by the great increase of traffic on the consideration of the Council with a view to their exercising the powers already acquired for widening the bridge. The original bridge was erected about fifty years ago, and is a granite structure of five segmental arches, its width originally being 42 ft. The author proposed to widen the bridge to 64 ft., and this was accomplished by means of overhanging footways supported by cantilevers, leaving the width of the original bridge for vehicular traffic.

Owing to the original structure being nearly all occupied for carriage traffic, the curb for the footways is formed of a vertical cast-iron web, with a bottom flange resting on a new course of granite work. The castings forming this curb are in lengths of about 12 ft. each, a tie-rod across the old bridge at a level near the bottom flange being placed at each joint so as to connect the casting on the one side of the carriage-way with that on the other, in order to counteract outward lateral pressure caused by vehicular traffic. The original capping of cutwaters was removed and gave place to massive clustered granite columns with molded bases and moulded and carved capitals, each column being set on a new granite base. The columns

carry the projecting cross girders before mentioned for a portion of their exposed length and thus considerably lessen the length otherwise unsupported. The upper portion of four projecting abutment piers was removed, and the remaining portion was covered with a moulded and carved course of granite corresponding in design with the capitals of the columns and forming a like support for the cross girders there occurring. The four terminal piers of the bridge were corbelled out about a foot, and furnished with a granite pedestal to receive the shore ends of main girders. The new parapet is surmounted on each side at intervals with ornamental lamps.

Considerable obstruction to public traffic, of course, necessarily ensued during the progress of the work, but two lines of carriage traffic and one line of footway were maintained throughout. This was accomplished by setting the cross girders in halves, joined together afterwards. The cost of the work was about 13,000*l.*

The New Albert Bridge.—The new Albert Bridge, spanning the river Lagan at East Bridge-street, was opened for traffic in August, 1890.

The old Albert Bridge, 30 ft. in width, built about sixty years ago, suddenly collapsed on the night of September 15, 1886, unfortunately causing the death of a watchman placed there to guard the traffic of what were considered certain unsafe portions of the structure. Means were promptly taken to connect the traffic between the two counties, and the Corporation, with commendable dispatch, and with facilities kindly granted by the Harbour Commissioners, ordered the construction of a pontoon bridge, which served admirably until a temporary timber bridge for vehicular as well as for pedestrian traffic, costing about 3,500*l.*, was erected. Meanwhile a Bill was promoted for the erection of a permanent structure, and this having been passed in the following year, the work was entrusted to Mr. James Henry, contractor, of Belfast, who in his turn placed the construction of the ironwork required in the hands of Messrs. Handyside, of Derby, the amount of the contract being upwards of 36,000*l.* After operations had been some time commenced the memorial stone was laid in the month of May, 1889, by his late lamented Royal Highness the Duke of Clarence and Avondale.

The new bridge is 60 ft. wide, and this width is certainly sufficient for present demands and will also amply meet future requirements. The bridge itself consists of three arches, each 85 ft. span, combining a minimum height of roadway with a maximum height of headway above the river and securing improved accommodation for the public traffic. Among the prominent considerations in connexion with the design were economy in cost and rapidity of construction. After the removal of those portions of the old bridge which were in the way and the deepening of the river bed, the foundations of the new piers and abutments were laid by the aid of coffer dams of single bank timbers grooved and tongued, this method being considered more economical than the adoption of ordinary puddle dams. The foundations being laid upon the solid rock, injurious tendencies connected with the scour of the river are averted. The abutments and piers having been raised to the proper height, the grooved and tongued piles were cut off at a level of about 12 ft. below low-water mark, the lower portions being left to form a permanent guard to the foundations. The foundations up to this height are formed of concrete, upon which have been built large square granite blocks from the Dalhettie quarries of the Messrs. Newall, and brickwork backing with concrete, the whole forming the abutments and piers to support the arching.

The bed from which the iron arches spring consists of a heavy moulded course of granite. Over this are placed cast-iron skew-backs to receive the cast-iron arching, the skew-backs being bolted down to the bottom of the granite work in order to secure their rigidity. The main supports of the roadway and the footways are of cast-iron arched ribs, eleven in each span, and each rib consists of five castings bolted together and having their joints accurately planed. These arched ribs form a solid platform, on which is constructed the superincumbent iron and surface work.

Where resting on the skew-backs the arched ribs are provided with cast-iron pivots accurately planed, which are adjusted by means of steel wedges, permanently introduced, securing

an equal bearing of the ribs at all parts of the skew-backs and thus avoiding any unequal strain. On the cast-iron arching there is a complicated series of wrought-iron uprights and cross braces bearing up the longitudinal girders, which in their turn receive the flooring of the bridge. This flooring consists of wrought-iron corrugated plates $\frac{3}{4}$ in. thick covering the whole extent, and upon it is placed a layer of concrete which receives the granite set pavement and the asphaltic footways which form the surface. At both sides of the bridge the external faces of the iron arching are faced with ornamental cast-iron work, the covering of the arched ribs being fitted, and the spandrels of ornamental foliated design including shields which bear the city arms. The parapet also is of ornamental cast-iron of open and pierced pattern, surmounted by a moulded cast-iron handrail. Above springing level the faces of the piers and abutments are built with granite work of the finest workmanship, extending to a level somewhat above the top of the parapet. Above springing level the faces of the abutments and piers where covered by the arching and other ironwork are of brickwork, the piers being built in hollow chambers in the usual manner. The approaches to the bridge are formed by four curved wing walls of finely worked granite blocks, and these walls where below the road-surface are backed by concrete, the whole resting on a concrete foundation, which latter, upon the County Antrim side, rests upon piles.

The estimates were ample enough to enable the Corporation to construct three granite approaches, quay walls adjoining the bridge approaches, each about 100 ft. in length, which not only form a permanent portion of the river improvement, but set off the appearance of the bridge. The actual expenditure on the bridge and its approaches, including the three quay walls above alluded to, may be taken at about 45,000*l.*

The Sewage.—Hitherto the sewage of Belfast has been discharged into the River Lagan, causing a constantly-increasing pollution of that river which in latter years has become all but intolerable.

So long ago as 1866, the late Borough Surveyor presented an exhaustive report recommending the intercepting of all the sewage of the borough and its discharge into the Belfast Lough at a remote place from the town, and the late Sir Joseph Bazalgette reported favourably upon this proposal.

The Corporation in 1870 promoted a Bill for carrying out this recommendation, including also proposals to reclaim a large portion of the tidal lands of the Lough with a view to using the land thus reclaimed for irrigation. The works embraced by this Bill were of such a costly nature that the Bill collapsed even before going into Committee, but the question was again revived in 1885, when the author reported to the Corporation upon an amended scheme of sewage interception, which after having been also reported on favourably by the late Sir Joseph Bazalgette was adopted generally by the Council, but not until 1887 was the Belfast Main Drainage Act finally passed.

For more than three years the author has been busily engaged in constructing the various works embraced by this Act of Parliament. The total cost is estimated at about 300,000*l.*, and up to the present time about half this amount has been expended.

The scheme includes the interception of all the sewage now discharging into the river on both its sides, and the connexion of the County Down side of the city with the County Antrim side by means of a "siphon" under the river. The main trunk sewers are twofold, one a high-level section and the other a low-level section. The low-level section is pumped into the high level at Duncrue-street in the northern portion of the city, and then flows down to a covered storage reservoir, which is designed to hold the accumulating sewage except between the time of high water and half ebb (thus securing the advantage of a strong ebb current carrying down the sewage towards the open sea), when it is discharged through a covered timber sewer built on the flats of Belfast Lough down to the deep water of Whitehorse Roads. This latter sewer is built altogether under low-water level, and has been a most difficult work to construct. A portion of the sewage flowing to the reservoir will discharge into the latter by gravitation, but the remaining portion requires to be pumped into it at an adjoining auxiliary pumping-station.

Of these works the following are completed

or now in progress:—The reclamation of about 25 acres of land from the tide to provide a site for outfall works, the construction of the timber sewer one mile in length, the covered reservoir, the outfall sewer, the high-level sewer, a portion of the low-level sewer, the Duncrue-street pumping-station, and the auxiliary pumping-station at the reservoir. The latter work and its accessories are being constructed on the 25 acre enclosure before alluded to.

The remaining contracts for the continuation of the low-level drainage and the crossing of the River Lagan, together with various branches to complete the system of interception, will follow rapidly on.

The main drainage works embrace many most difficult problems involving special and costly adaptations to the peculiarities in connexion with the strata and the physical contour of the city. As an illustration of this it may be observed that the storage reservoir and its accessories are erected entirely on a piled foundation in which about 7,000 piles have been driven.

It should also be observed that although the present intention of the Corporation is to discharge during a certain tidal term crude sewage into the sea, the Main Drainage Act provides for the reclamation of more ground from the Lough in view of the possible contingency of some system being thought advisable for precipitation or other mode of purification; but it is hoped that, as in the case of Portsmouth, the necessity for any attempt to treat the Belfast sewage by any special process may be indefinitely postponed, unless indeed some method can be devised whereby the Corporation could deal with the matter without serious cost to the ratepayers.

Markets, Parks, &c.—Belfast is possessed of extensive market accommodation, and a short time ago the author constructed the first and second sections of a covered market which, when fully extended to its proposed limits, will form a leading feature in the corporate property.

For many years back the Corporation have expended large sums of money in removing, under special Parliamentary powers, old and dilapidated property in various unsanitary and congested districts, thus transposing these localities into handsome streets and open spaces fringed with valuable new buildings.

Amongst such street improvements Royal-avenue takes the foremost rank. The formation of this thoroughfare 80 ft. in width, connecting the northern and southern portions of the city, has, no doubt, proved one of the most successful street improvements accomplished by any municipality in the United Kingdom.

Other important improvements of this nature are about to be immediately undertaken by the Corporation.

Belfast possesses several parks and recreation grounds, which have been laid out in recent years by the Corporation, to a considerable extent under the direction of the author.

Ormeau Park, 100 acres in extent, was the first thus laid out, followed by the Falls Park, Alexandra Park, Woodvale Park, and, lastly, Dunville Park, the generous gift to the city by Mr. R. G. Dunville.

Public baths have been erected by the Corporation in three districts, and it is intended shortly to erect two other institutions of this class.

Corporation Gasworks.—The gasworks were purchased by the Corporation in 1874. Since this time the gas has been reduced by the Corporation from 4s. 6d. to 2s. 9d. per 1,000 cubic feet. The profits have been yearly very large, and amounted last year to 34,462*l.* At the present time there is urgent need for large extensions of these works, and the Corporation are at present engaged in selecting a site for additional works.

Waterworks.—The water supply for the city and neighbourhood is under the control of the Belfast City and District Water Commissioners, a separate corporation, the members of which are elected by the ratepayers. Large sums of money have been expended in grappling with the constantly increasing demand for water, and at the present time a scheme is being prepared for obtaining an Act of Parliament next session for an additional supply from the neighbourhood of the Mourne Mountains, some thirty miles or so distant.

Mr. J. P. Spencer (Newcastle-on-Tyne) proposed a vote of thanks to Mr. Bretland for his paper. He said the City of Belfast had caused him infinite surprise and pleasure at the im-

mense advantages which it enjoyed from the industry and perseverance of its people. The members attending the meeting had had an opportunity of inspecting the very excellent detailed drawing of the various public works carried out in Belfast, and having looked over them he wished to congratulate Mr. Bretland on the admirable way in which they were prepared, and to add that they required no explanation, for an expert had only to look at them to judge what the work would be when carried out and finished.

Mr. J. Perry (Galway) seconded the vote of thanks. Having highly commended the public spirit and enterprise of Belfast in many directions, Mr. Perry urged that the city was much behind in the matter of electric lighting. He was one of the proprietors of an electric lighting works at Galway, which was selling electricity at 3d. per unit for motor work and 5d. per unit for lighting purposes. He commended the example of Galway in electric lighting as worthy the imitation of Belfast.

Mr. A. M. Fowler (Manchester) thought it would be well if Mr. Bretland could show that the street improvements effected in Belfast had been a financial success, because there were many towns in England contemplating street improvements. He knew that in Leeds such improvements had been a financial success. When Boar-lane, in Leeds, was 24 ft. wide, the highest price obtained for land was 3*l.* per yard, but after it had been widened to 60 ft. land sold for as much as 60*l.* per yard. It was thought at the time that the rates would be very much increased by the making of this improvement, but they were not increased a single penny. This was due to the Corporation taking more land than they required for the street, and selling the surplus land at a profit, and the increased value of the rates on the new property. This was very important, as many towns were frightened from undertaking necessary street improvement from fear of the increased rates.

Mr. T. de Courcy Meade (Hornsey) said he regarded the timber outfall sewer as one of the most interesting points of the drainage scheme.

The President having expressed the extreme interest which he felt in the visit to the Water-works, put the vote of thanks to Mr. Bretland, and it was adopted by acclamation.

Mr. Bretland, in acknowledging the vote of thanks accorded to him for his paper, said he was happy to hear, from the experience of Mr. Fowler, that public street improvements could be made which would ultimately turn out, not a loss, but an advantage to the ratepayers. The timber sewer which had struck Mr. Meade as being unique had emanated from the minds of Sir Joseph Bazalgette and Sir Frederick Bramwell; and he admitted that its construction was the most difficult work he had ever undertaken in his life.

[We will conclude our report of this meeting next week.]

Illustrations.

AMBONE FROM THE CATHEDRAL, SALERNO.

THIS is a reproduction of a pencil-drawing by Mr. F. D. Bedford, which was exhibited at the last Royal Academy.

The upper part of the pulpit is of white marble inlaid with mosaic,—gold, white and red,—arranged in geometrical patterns. The circles in the panels are of green and red porphyry. The columns are of granite and are 9 ft. high; the capitals and bases are of white marble. The pulpit is a noted example of South Italian Medieval work.

The steps leading up to the pulpit are at the back, encased in marble.

WINDOWS, TRINITY AND ALL SOULS' COLLEGES, OXFORD.

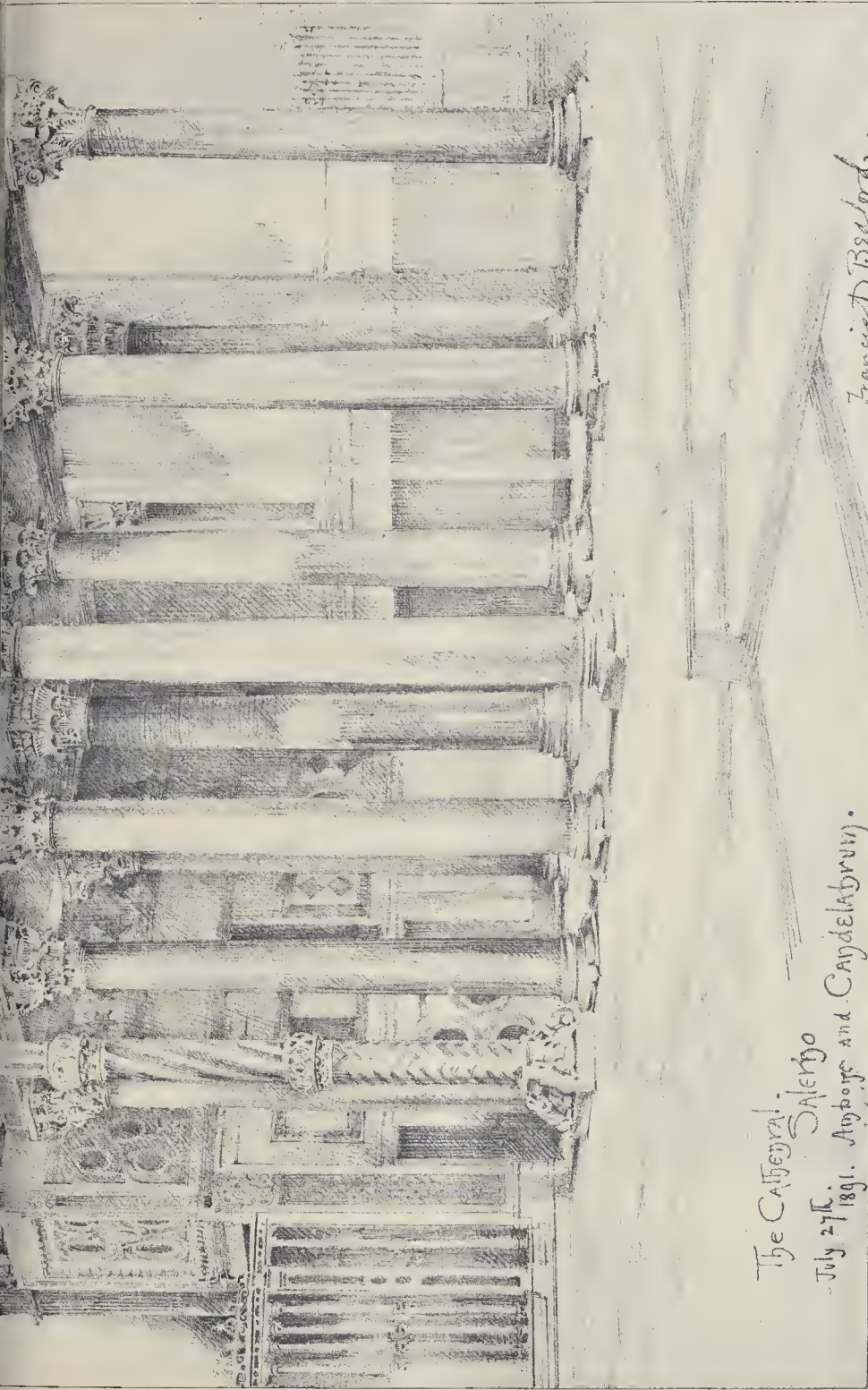
THESE two windows, the drawings of which were exhibited at the Royal Academy of this year, were designed by Mr. James Powell, of the firm of James Powell & Sons.

The Trinity window was erected some years ago, with several others of a similar style of design. The All Souls window is the first of a series for the hall of that College. The central figure represents Sir C. Wren; below are the arms of Messrs. Buller & Curzon, the donors of the window. The arms above are those of



THE BUILDER. OCTOBER 8, 1892.





The Cathedral - Salerno
- July 27th 1891. Ambrose and Caydelabruni.

Francis D. Bradford.

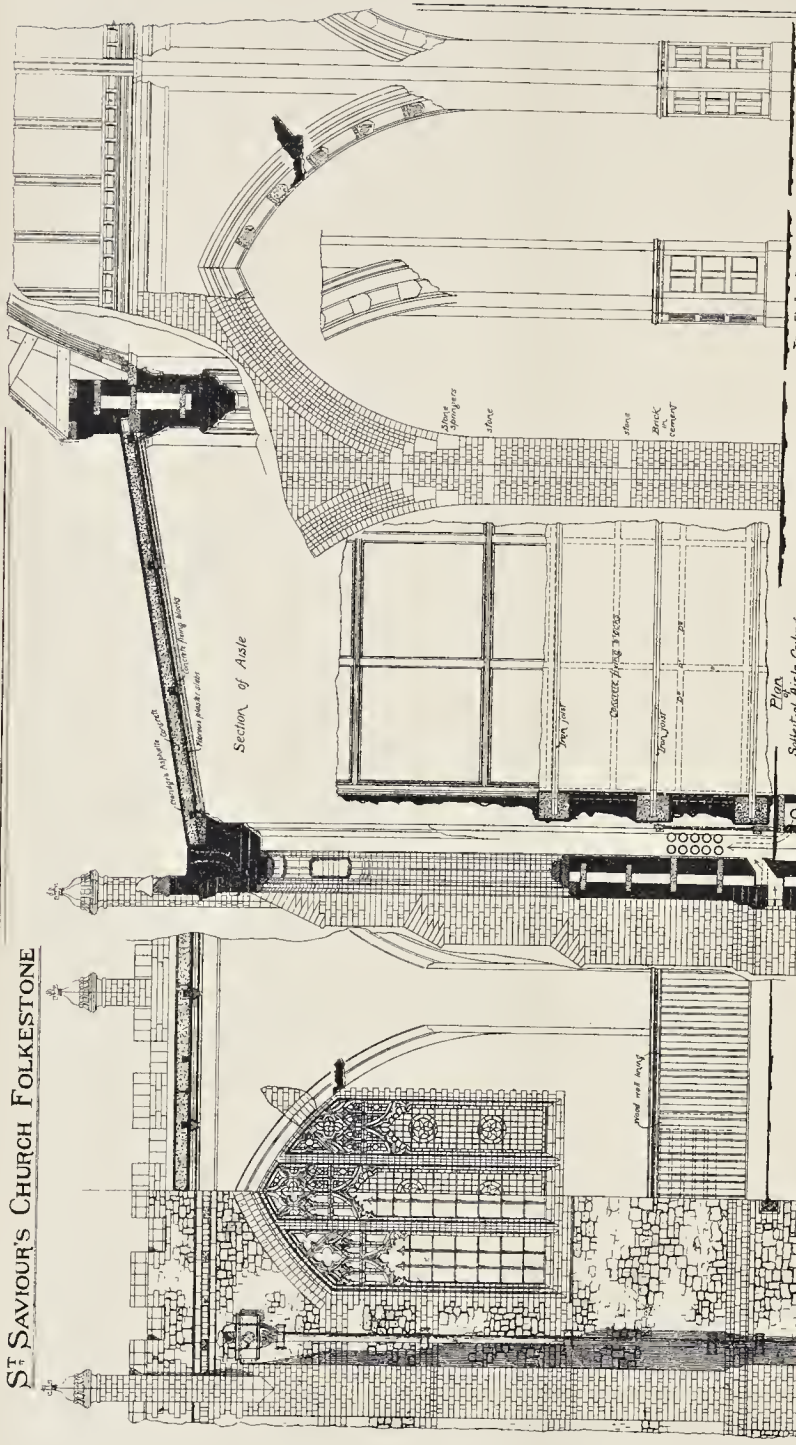
THE D. C. SPRAGUE & CO. 485 EAST HADING STREET 75' x 10' LANE E.C.

AMBONE FROM THE CATHEDRAL, SALERNO—FROM A DRAWING BY MR FRANCIS D BRADFORD, A R I B A

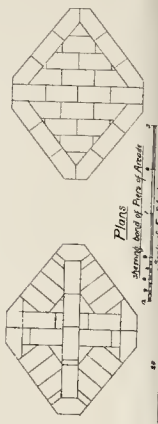
Royal Academy Exhibition, 1892



ST SAVIOUR'S CHURCH FOLKESTONE



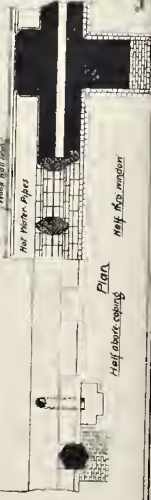
Elevation of one bay of Nave arcade



Somers Clarke & J.T. Nicholletworth } Architects

Scale of 1/4 inch = 1 foot

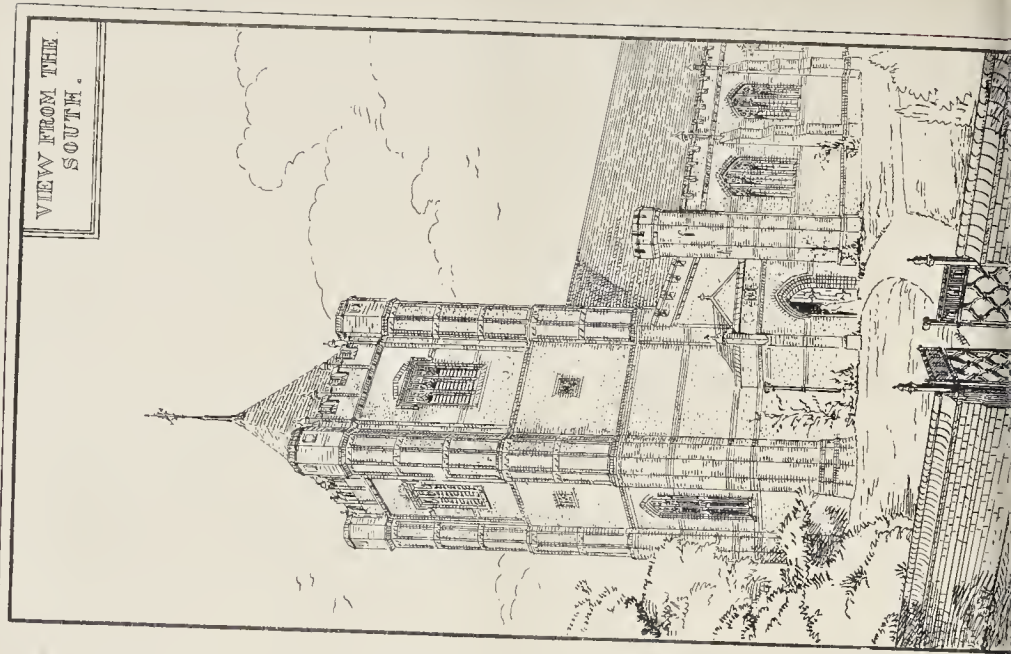
Half Internal Elevation of one bay of Aisle



Plan

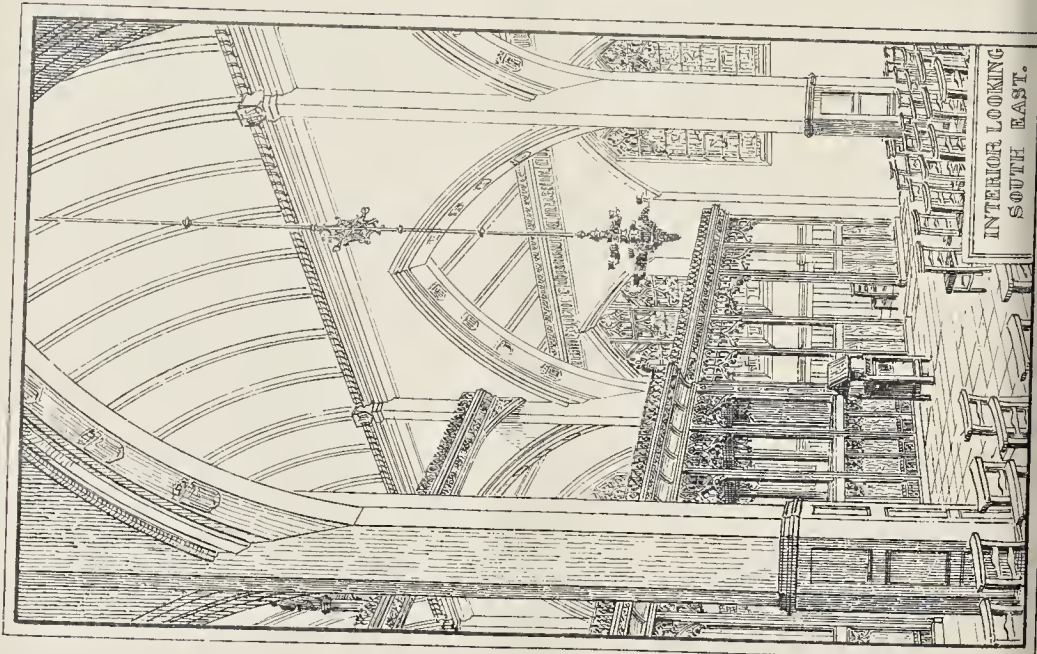
Half bay elevation





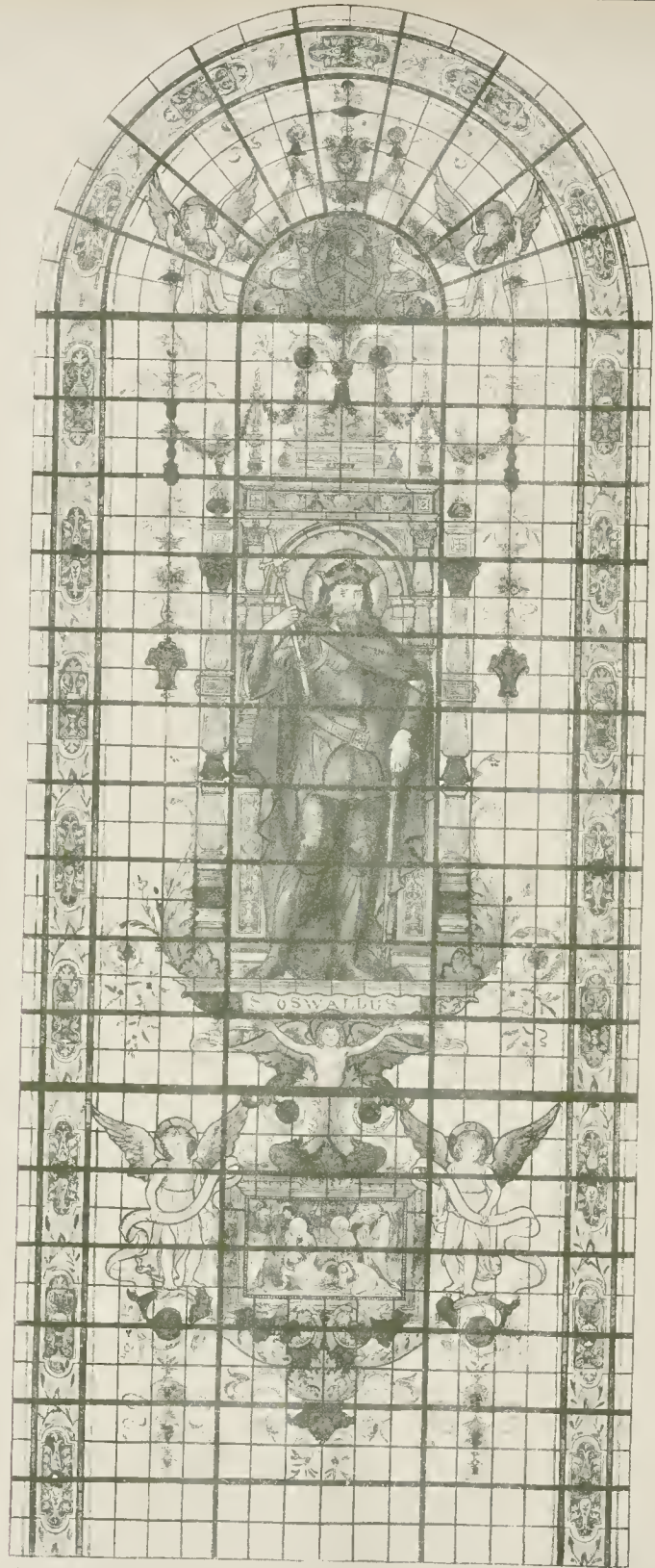
VIEW FROM THE SOUTH.

ST SAVIOURS
CHURCH, &c
FOLKESTONE
—
SONNERS CLARKE
& MICKLETHWAIT
ARCHITECTS.



INTERIOR LOOKING SOUTH EAST.



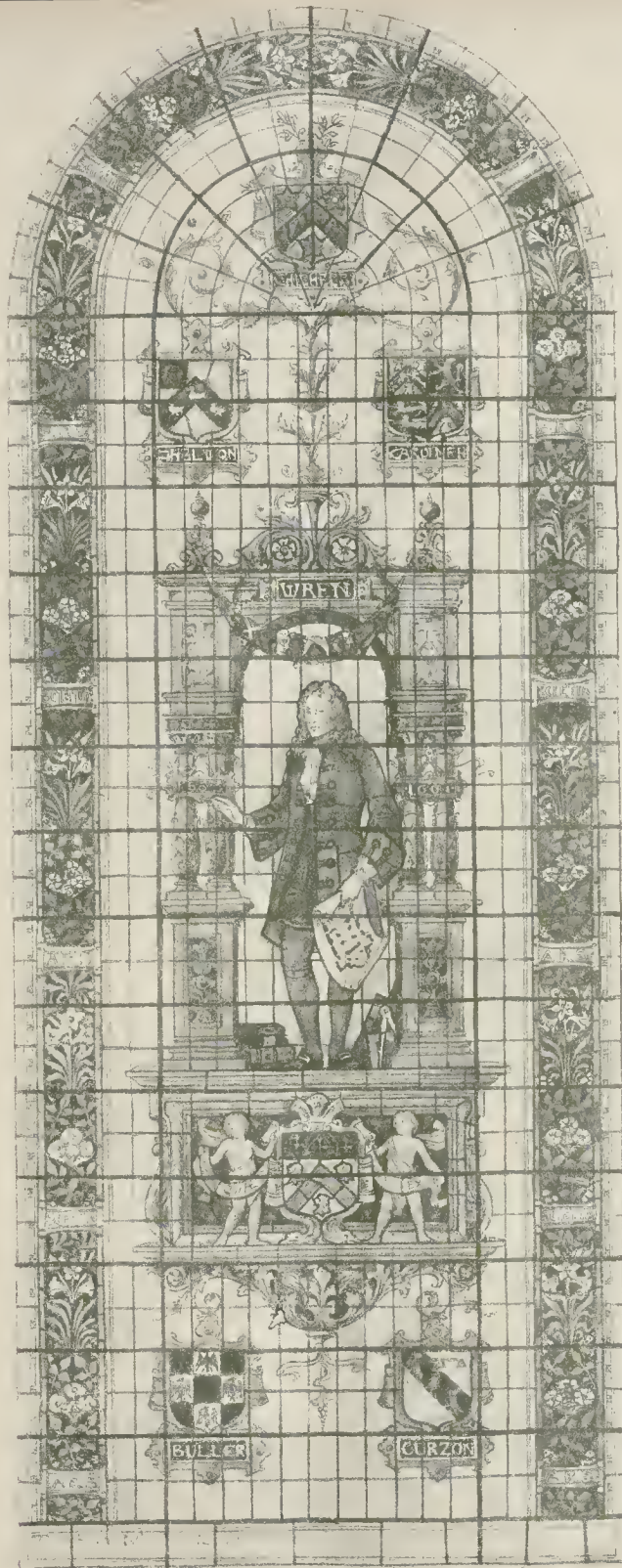


INS 12 6 0 1 2 3 4 5 6 FEET

INK PHOTO SPRAGLE & CO. 4 & 5 EAST HARDING STREET FETTER LANE, EC.

DESIGN FOR A WINDOW, TRINITY COLLEGE, OXFORD.—BY MESSRS. JAS. POWELL & SONS

Royal Academy Exhibition, 1892

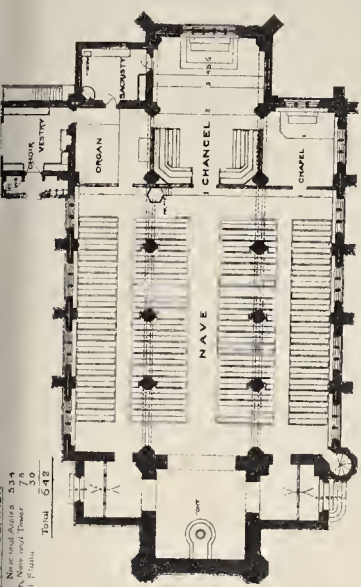


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INK PHOTO SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

DESIGN FOR A WINDOW, ALL SOULS' COLLEGE, OXFORD—By MESSRS JAS POWELL & SONS

SOUTH ELEVATION.



Area of Nave and Aisles 2,354
 Choir, Sacristy, Tower 776
 Overall Floor Total 3,130

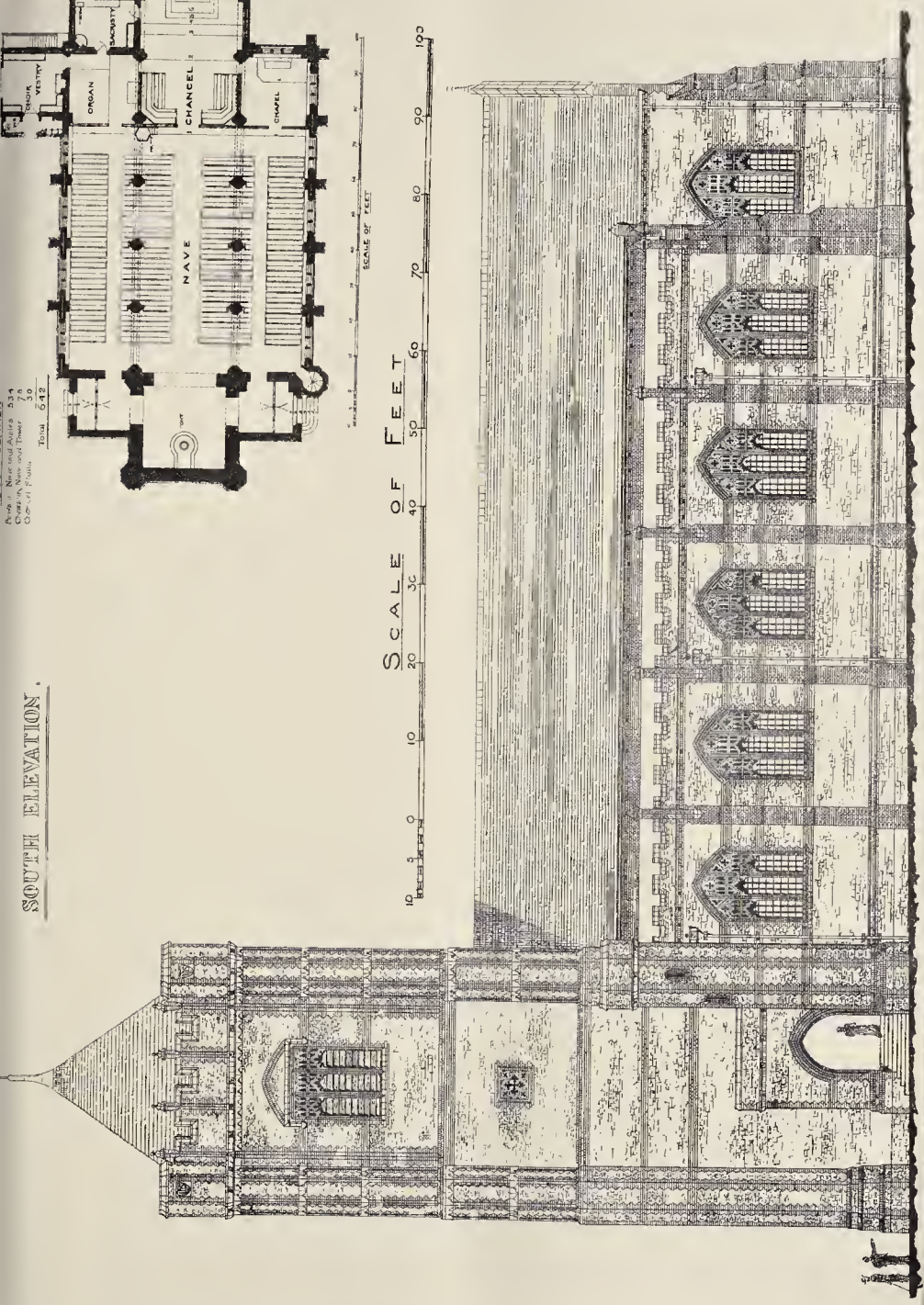
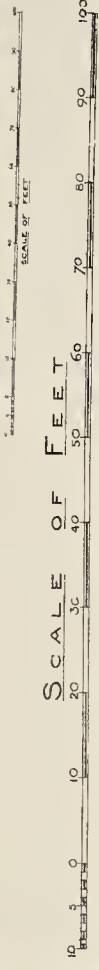
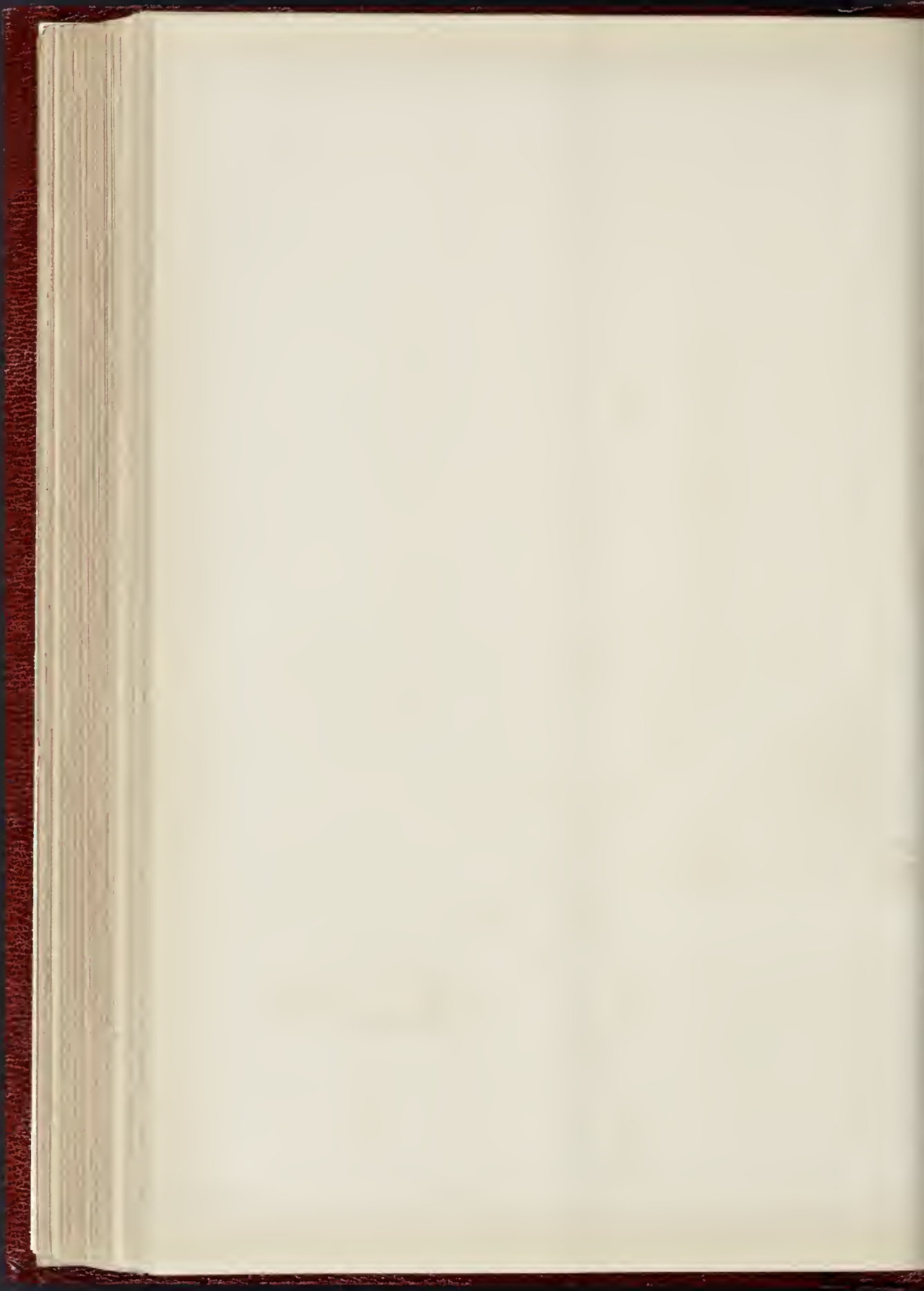
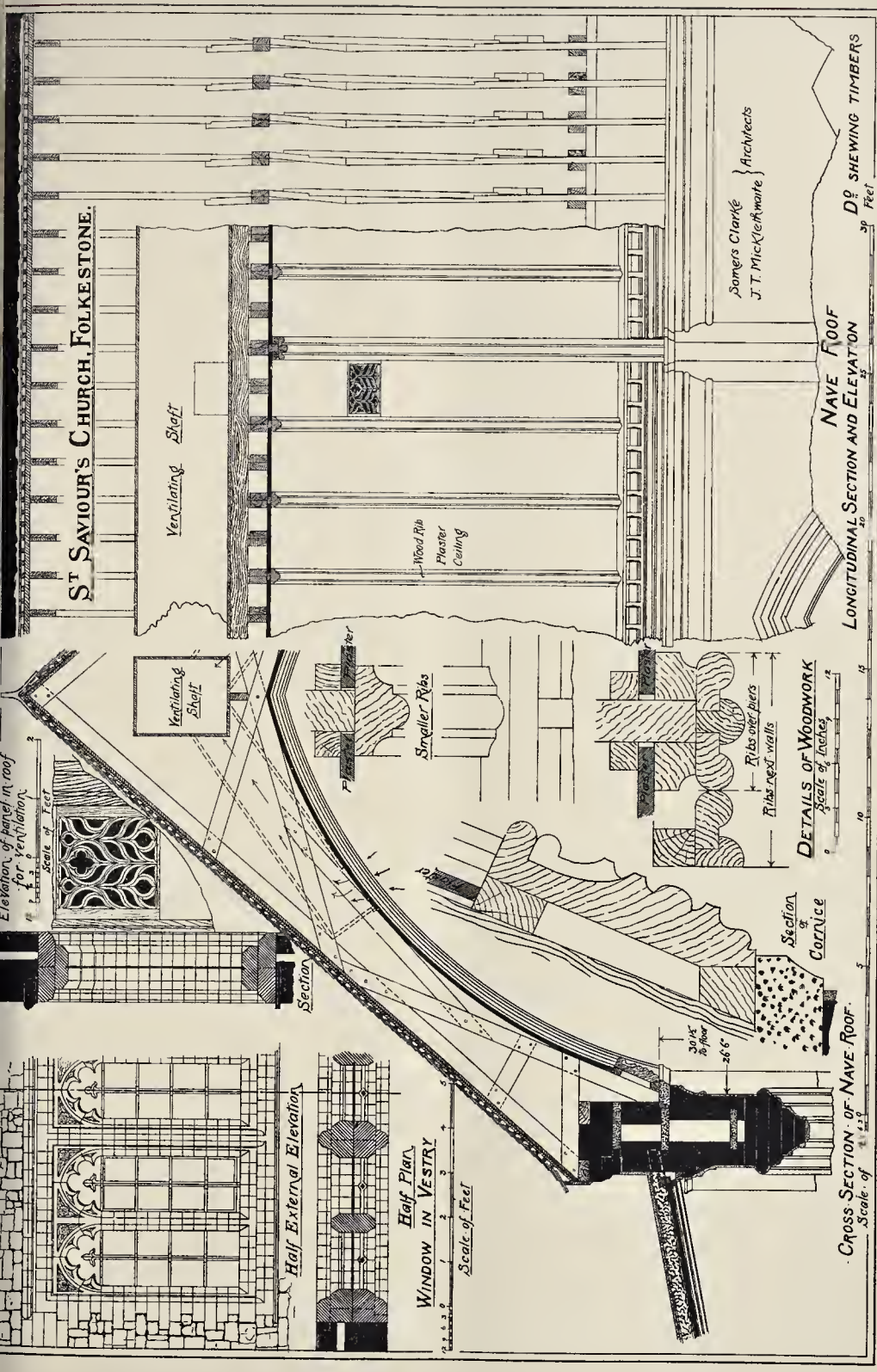


PHOTO-LITHO BRADSHAW & CO. 485 EAST WABING STREET FETTER LANE E.C.



ST SAVIOUR'S CHURCH, FOLKESTONE.

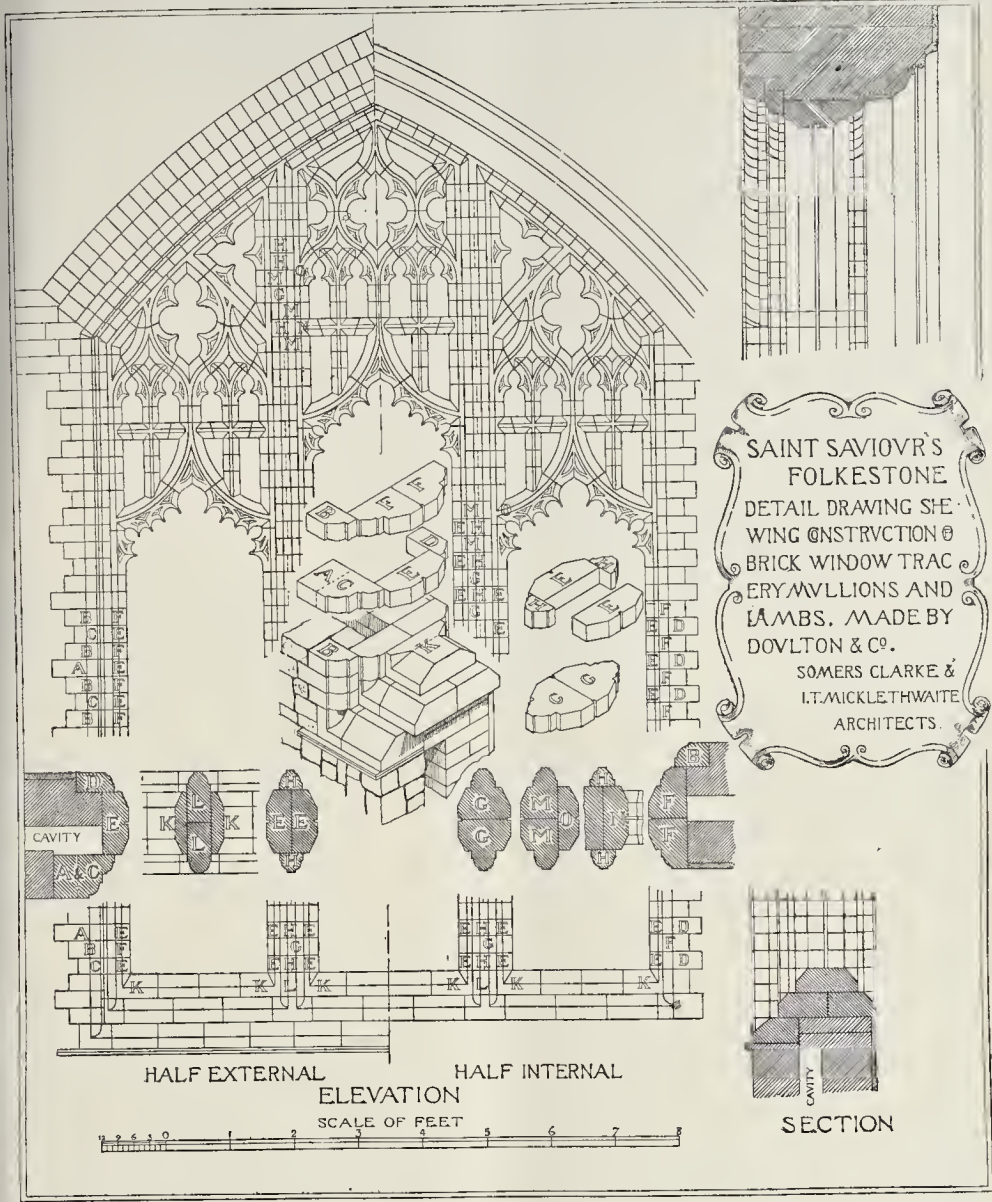


**NAVE ROOF
LONGITUDINAL SECTION AND ELEVATION**

D^o SHEWING TIMBERS
30 Feet

Somers Clark & J.T. MacKie } Architects

PHOTO-LITHO SPRADUE & CO. 4 & 5 EAST HARBING STREET LITTLE LANE E.C.



SAINT SAVIOUR'S
FOLKESTONE
DETAIL DRAWING SHOWING
CONSTRUCTION OF
BRICK WINDOW TRACERY
MULLIONS AND LAMBS. MADE BY
DOULTON & CO.
SOMERS CLARKE &
J. T. MICKLETHWAITE
ARCHITECTS.

Sheldon & Gardiner, two of the Wardens of the College during Wren's time. The figure of Wren is taken from a portrait.

ST. SAVIOUR'S CHURCH, FOLKESTONE.
THIS church, when complete, will consist of a nave of four bays, with north and south aisles, and a large western tower opening into it; of a chancel of two bays, with north and south aisles, that on the south being used as a side chapel, and on the north as an organ place. The sacristy and choir-vestry adjoin the organ place. The chancel is 39 ft. long inside; the nave and tower 97 ft. long. The width of the nave and chancel, which have a roof running through continuously from east to west, is 26 ft. 6 in.; each aisle is 18 ft. wide, and the total internal width is 67 ft. To the wall plate there is a height of 30 ft. from the nave floor, and to the ridge of the pointed barrel-ceiling is

48 ft. Over the choir-vestry is a blowing-room for the organ.
The church stands on clay and is in a very exposed position. The sea air soon eats into stonework. The outside walls of the church are, therefore, built hollow, with an outer skin of Kentish rag with brick dressings and an inner skin of brick, the two being tied together with slabs of paving-stone. The dressings are of brick. The window-jambs and tracery are of terra-cotta made by Messrs. Doulton. The object the architects have had in view in designing the window has been to treat terra-cotta as what it really is,—superior brick, and not sham stone. The pieces are all small, and range in colour, jointing, &c., with the adjoining brickwork.
The church is built inside of hard rough brick to receive plaster. The piers will be decorated with sgraffitto, as will be the spandrels above the arches. The arches themselves

will have moldings in plaster, treated flatly and to suit the material, and in no way to imitate stone. The inner ceiling of the nave and chancel, which takes the form of a pointed barrel-roof, is in plaster with wood ribs. The aisles, which have flat roofs, are covered with Fawcett's fireproof system of hollow tube construction, laid on the outer side with Claridge's asphalt. The chancel is paved with squares of black and white marble. To isolate this floor from the damp it is laid on Fawcett's fire-clay tubes. Wall panelling will be carried round the church, and the bases of the piers are also to be similarly encased.
At present the chancel, one bay of the nave, the organ place, and the sacristy are completed and in use.
The builder is Mr. Dnnk, of Folkestone; the architects, Messrs. Somers Clarke and J. T. Micklethwaite, of Westminster.
The complete set of drawings, as published

in this number, has been hung during the week in the Loan Exhibition of Ecclesiastical Art at the Church Congress at Folkestone.

MAGAZINES AND REVIEWS.

The *Gazette des Beaux-Arts* contains the first of some articles by M. Eugène Müntz on that rather new and very interesting subject, "Le Propagande de la Renaissance en Orient." This article deals with Turkey and gives some account of Gentile Bellini's artistic relations with Constantinople. Much of the influence of Renaissance art on the East, as far as it existed, came of course through Venice; how largely Venice was influenced by Eastern art has always been recognised, but the converse influence has been rather overlooked. The *Gazette* contains also an article on the "Musée des Antiques à Vienne" by M. Salomon Reinach, and one by M. Mazerolle on "Les Grands Médailleurs Français."

We cannot sympathise with Mr. Spielmann in starting the October number of the *Magazine of Art* with an appreciative article on M. Jan Van Beers, than whom no artist (of any ability) of the day seems to us to be more irredeemably vulgar, or to have done more to degrade the art of painting (always with ability, let it be admitted). Mr. Gilbert E. Samuel contributes the second of his articles on "Copyright in Works of Art." An article by Mr. Harry L. Tilly, on Burmese Art, introduces us to rather new ground and some characteristically grotesque illustrations. Mr. Bernard Hamilton's article on "French Feeling in French Pictures" we read with much interest and sympathy, and the illustrations are well chosen. An engraving by Jomard of Privet's clever painting "Her Friends," and a finely felt quasi-Medieval illustration to a ballad, by Mr. C. Ricketts, are among the full-page plates.

In the *Art Journal* Mr. Horace Townsend's article on English and American architecture contains some very well-produced illustrations of the latter. As one reason for the superiority claimed for American street architecture over English (a feeling which is perhaps being carried a little too far), we are told that the rich American generally builds his own town house, the rich Englishman certainly as a rule does not: there is a point in this. An article on "John Linnell's Country" by Mr. A. T. Story is illustrated by some charming slight landscape sketches. Mr. Aylmer Vallance continues "The Furnishing and Decoration of the House" with some good illustrations of textiles. Mr. Huish continues his rambles in the Isle of Wight, and the number is prefaced by an etching of Norwich Cathedral by Mr. Slocombe, in which the tower and spire are rather heavily touched, or else the plate has not printed satisfactorily.

The *Antiquary* includes Mr. Micklethwaite's paper on "The Restoration of Churches," read at a recent Archeological Congress, and a paper by the Rev. J. C. Cox on "The Marshland Churches," with some illustrations which are not very satisfactory from an architect's point of view; the Rev. B. J. Harker contributes an article on "Discovery of Pre-historic Remains at Grassington," and Mr. G. Payne one on a discovery of Anglo-Saxon remains at Rochester.

In the *New Review* Mr. Frederic Harrison broaches some very crude views on "London Improvements" in the course of which he ventures the astounding, we might say impudent assertion that it is the working men only who care for and appreciate London, and are interested in preserving its beauty. Mr. Harrison winds up with an eloquent sentence in hopes of our "yet seeing a noble London, worthy of its past history and its future greatness"; and in partial furtherance of this hope he suggests the removal and rebuilding of one of London's noblest structures, Waterloo Bridge. It is a pity able men like Mr. Harrison will rush into print about matters they do not understand.

The *Fortnightly Review* presents us with an article on Raphael by a genuine art critic, Mr. Walter Pater, whose words on things æsthetic, if a little over-refined, are always worth reading. He draws attention among other things to Raphael's great power of narrative painting, and suggests that some of the practical life of Florence, by contrast with the more ideal schools from which he came, gave to his work this turn for real expression of human action. On the other hand, he remarks well on Raphael's noble

manner of expressing ideas through figure composition: "Plato supposed a kind of visible loveliness about ideas: well in Raphael, painted ideas, painted and visible philosophy, are for once as beautiful as Plato thought they must be, if one truly apprehended them."

In *Scribner's Magazine* Mr. Brownell continues his critical dissertation on French art, with some very just remarks on the earlier romantic school of France (Delacroix, Géricault, &c.), remarking on their Classic reserve of style in spite of romantic tendency of feeling. On Corot he says well that his great power lay in getting so far away at once from pigments and from the mere actualities of nature, and that if the Greeks had left any landscape we might fancy it would have been something like Corot's. Mr. Brownell, however, has not corrected or acknowledged his portents blunder in the last month's number, in representing a celebrated Turner as a Claude, while he was actually maintaining Claude's superiority.

Harper's Magazine this month contains nothing of special interest in an artistic sense, unless we include under that heading the second of a rather ghastly series of papers on "A Collection of Death Masks" of eminent men, who, if they were bored by having their portraits taken in life, might at least have claimed that their faces should be let alone after death.

The *Atlantic Monthly* contains two articles of special interest to our readers, "The Betterment of our Highways," an essay by Mr. N. Southgate Shaler on the treatment of highroads in America; and Mr. Theodore Child's well-illustrated article on "Paris along the Seine."

Harper contains No. 5 of Mr. van Brunt's articles on "Architecture at the Chicago Exhibition," describing the Fisheries building, and giving some illustrations of original designs for capitals in which fish, frogs, &c., are worked in. These are spirited, but too naturalistic; if naturalistic modelling of animals is desired, a capital is not the place for it; formal treatment is necessary here, and the outline of these capitals is ragged and unpleasing. An article on "Picturesque Plant Life of California," by Mr. C. H. Shinn, has some curious and interesting illustrations of vegetation. Mr. Stillman, in "Italian Old Masters," deals this month with Correggio, his brief criticism on whom about sums up the truth concerning this much-discussed artist.

Macmillan's gives an article by Mr. A. G. Hyde on "New England Architecture," the continuation in New England of the English form of domestic architecture of late Jacobean period; a kind of article, however, which almost demands illustrations, which are not in *Macmillan's* programme.

The *English Illustrated Magazine* contains an article, "A Summer among the Dovecotes," by Mr. A. Watkins, with illustrations drawn by Mr. C. M. Geere and Mr. E. H. New, from the author's own photographs. Few of the dovecotes shown, however, have any very picturesque character.

Among articles of the month on practical or scientific subjects we may mention in the *Gentleman's Magazine*, "The Sun among his Peers," by Mr. J. Eliard Cooke, a comparison of the sun with others of the stars; in the *Asiatic Quarterly*, the "Physical Geography of Persia," by Mr. E. C. Biddulph; in the *Nineteenth Century*, "Can Mount Everest be Ascended?" by Mr. Clinton T. Dent, who thinks we may yet become acclimatised to existence at an elevation of 29,000 ft., and calls the ascent "a tremendous undertaking, but a magnificent possibility," in the *Contemporary*, "The Recent Heat-Wave," by Sir R. Ball, who gives his explanation of the phenomenon, and an article on "The Rise of the Coal Trade," by Mr. R. L. Galloway, a kind of history of the use of coal as fuel.

INFECTIOUS DISEASES HOSPITAL, KEIGHLEY, YORKSHIRE.—At the monthly meeting of the Keighley Town Council on the 4th inst., the Mayor in the chair, the competitive set of plans for the proposed infectious diseases hospital, sent in by Messrs. Judson & Moore, architects, Keighley and Bradford, were approved. The hospital, which is to provide isolated departments for typhoid fever, scarlet fever, and smallpox, with administrative block and out-buildings, will cost about 4,000l.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—The first sessional meeting of the Manchester Society of Architects was held at the Literary and Philosophical Society's Rooms, George-street, on Tuesday evening last, the President, Mr. Salomons, in the chair. Mr. F. W. Bedford, A.R.I.B.A., read a paper entitled "Some Illustrations of the Arts in Sicily," which was illustrated by lantern views and sketches. He lightly touched upon the remains of the Greek Temples of the Dorian colony, and chiefly devoted his remarks to the Christian architecture. Illustrations were given of the interiors, showing, besides varied marbles and sculptured work, the beautiful mosaics covering the walls, and in some cases the ceilings, of the churches and cathedrals, amongst the number being those at Palermo, Monreale, Cefalù, &c. The lecturer pointed out that Ferguson believed that it was only through these buildings that we could judge whether polychromy by opaque pictures in mosaic or by translucent pictures on the glass of our stained windows is the more beautiful mode of decorating an interior. A very large and admirable collection of drawings, made during a year's tour in Italy by the lecturer as Owen Jones Travelling Student of the Institute, was exhibited. A hearty vote of thanks was accorded to Mr. Bedford for his paper.

THE CLEANSING AND VENTILATION OF SEWERS:

SOCIETY OF ENGINEERS.

At a meeting of the Society of Engineers, held at the Town Hall, Westminster, on Monday evening last, Mr. Joseph William Wilson, jun., President, in the chair, a paper was read by Mr. B. A. Miller on "The Cleansing and Ventilation of Pipe Sewers."

The author having mentioned the difficulties which had been experienced in many towns sewered on the combined system, owing to the road *détritus* being washed into the sewers through inattention to gully cleansing, drew attention to the necessity of constant flushing to prevent the generation of sewer gas, due to the decomposition of deposited matter; he further stated that sewerage systems, though well designed and carried out, were often rendered incomplete owing to faulty house connections and insufficient water supply. He then compared the systems of combined and separate sewerage, giving the following reasons for preferring the latter:—Smaller sewers are required; surface water drains need not be laid as deep as sewers; the exclusion of surface water gives less liquid to deal with and he treated; there is greater regularity in the flow, enabling the size of sewers to be calculated more accurately; the sewers, being smaller, afford less space as gas-holders, and require less water to flush. He recommended the admission of roof-water into the sewers, as simplifying the arrangement of drains. He then alluded to flushing, giving the different methods employed. The use of pen-stocks or plugs, causing the sewage to back up, he considered unsatisfactory, as deposits are left in the pipe to decompose. In preference he advocated the adoption of flushing chambers, containing automatic syphons, mentioning those of Messrs. Doulton, Rogers Field, Adams, and Palmer, and proceeded to describe their action, giving preference to those with a deep trap.

Passing to the question of ventilation, he stated that provision should be made to prevent sewer gas passing directly into the air we breathe; and proceeded to enumerate the different methods employed for ventilating sewers, describing first the usual method by shafts from the sewer to the street level, with open gratings in the roadway, intended to act as outlets and inlets, but which were often an annoyance owing to the irregularity of their action. Briefly mentioning the use of charcoal filters, and the utilisation of chimney shafts, he described the Holman-Keeling sewer-gas destructor, which he considered effective, though costly, and suggested the erection of iron shafts, either open at the top or provided with cowls, which could take the place of street lamps, placed on the line of kerb and connected with the sewer.

The author next gave a description of a series of experiments taken in one of these shafts at Beckenham, with a view of ascertaining the advantage of ventilating sewers by ven-

lating lamp-posts as compared with the ordinary method of gratings in the roadway. The result of these experiments were embodied in a series of tables and charts, and by their means the author showed that the best results were obtained when the street ventilators were open, and further, that the direction of the wind was the chief agent which influenced the movement of sewer air in the shaft, the temperature also affecting it under certain conditions. In conclusion, he recommended, in order to keep sewers in their proper state, periodical flushing by automatic chambers, and an efficient method of ventilation by ventilating-posts, which, he considered, would produce a better current of air in the sewers than is obtained by the ordinary method of street openings alone. The paper was well illustrated by diagrams, showing the various systems advocated.

Sir Henry Roscoe, M.P., F.R.S., has recently been elected an Honorary Member of the Society of Engineers, in the place of Professor John Couch Adams, F.R.S., deceased.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday afternoon at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Finance: Terms for Repayment of Loans.—In submitting the report of the Finance Committee, Mr. Evan Spicer stated that they had carefully considered whether the rate estimates needed revision. So far as had been ascertained, although some Committees had sent in supplemental estimates, others had made reductions, and as there remained a balance of the Exchequer contributions the Committee would not have to ask for any increase upon the amount voted at the beginning of the year. He hoped the Council would consider this satisfactory, and that a still more satisfactory report would be presented at the end of the financial year. The Finance Committee also reported that they had for some time been in communication with her Majesty's Treasury with a view to obtaining their sanction to the repayment of loans advanced by the Council to other public bodies by the annuity system instead of the instalment system when so desired by the borrowers, and had now the satisfaction of reporting that the Treasury had given a general consent to the repayment of loans on the annuity system for the following periods:—For the purchase of land in fee simple, fifty years; for the purchase of houses or for building purposes, thirty years; for fittings and expenditure of less permanent character, not exceeding fifteen years.

Resignation of the Comptroller.—The General Purposes Committee presented a report in which they said: "We regret to have to report that a letter has been received from Mr. Gunn, requesting permission to resign his appointment of Comptroller to the Council. On the 5th of July last we reported that Mr. Gunn had been suffering from ill-health for some months, and the Council then, on our recommendation, granted him six months' leave of absence on full pay from June 1. Mr. Gunn states in his letter, dated August 31, that twelve weeks had elapsed since he left London, but that there was no sign to encourage the hope that he would ever be fit for active duty. He therefore asks the Council at its convenience to accept his resignation and to grant him a pension, expressing at the same time the hope that the 5th section of the Superannuations Act, 1866, may be taken as applying to his case. The Council can grant to an officer resigning his office under the provisions of the Act an annual allowance at the rate of a sixtieth of his salary in respect of each year's service not exceeding forty years; but there is an additional provision (section 5 to which Mr. Gunn refers) that in the case of a person appointed to an office when over thirty years of age on account of professional or other peculiar qualifications not ordinarily to be acquired in the Council's service, the Council may in computing the amount of his superannuation allowance add a number of years not exceeding ten to the number of years he may actually have served. Mr. Gunn was thirty-two years old when he was first appointed in February, 1869, Accountant to the late Metropolitan Board of Works. He came from the

Treasury, where he had acquired considerable knowledge and experience in matters of finance; and we think the experience he thus brought may properly be regarded as a 'peculiar qualification' such as is referred to in section 5 of the Act. Mr. Gunn's services to the Council as well as to the late Metropolitan Board have been so valuable, and his labours during the last three years, owing to the great changes and complications entailed by the Local Government Act, 1888, have been so arduous, that we think the Council may be advised to grant him a retiring allowance of the highest amount authorised by the statute. We accordingly recommend:—

"That Mr. Gunn's resignation be accepted, and that the Council do grant to him a retiring allowance of 600*l.* a year, being at the rate of thirty-three sixtieths of his salary of 1,200*l.* a year, ten years being added to his twenty-three years of actual service, as authorised by the 5th section of the Superannuations Act, 1866."

Mr. Crooks moved, as an amendment,

"That Mr. Gunn's resignation be accepted, and that the Council do, under the provisions of the Superannuations Act, 1866, grant to him in respect of his twenty-three years' service a retiring allowance of 400*l.* a year, being at the rate of twenty-three sixtieths of his salary of 1,200*l.* a year."

After a long discussion, in the course of which Mr. Gunn's services in the work of the financial administration of the Metropolis were highly eulogised, the amendment was defeated by one vote (57 against to 56 for), and after a further amendment which sought to fix Mr. Gunn's retiring allowance at 600*l.* had been negatived, the recommendation of the Committee was agreed to.

Proposed purchase of Street Tramways.—Mr. Benn, M.P., Chairman of the Highways Committee, moved that a notice should be forthwith served upon the North Metropolitan Tramways Company, requiring the Company to sell to the London County Council certain tramways, works, and undertakings; that the Clerk should be instructed to apply to the Board of Trade for its approval of the terms of this resolution; and that the Finance Committee should be empowered to take the necessary steps to obtain the insertion in the Council's Money Bill of 1893 of a clause empowering the Council to raise the money required. He said the purchase of this particular tramway was likely to prove a good investment for the ratepayers. According to the last report of the Company in question, which owned 49 miles of tramway, a sum of 2,120*l.* per mile per annum had been earned.

Mr. Boulton, M.P., as an amendment, moved:—

"That, inasmuch as an arbitration is now proceeding with reference to the terms upon which the Council should purchase a part of the undertaking of the London Street Tramways Company, the Council is of opinion that the result of that arbitration should be ascertained before the Council resolves to purchase the undertaking of another Company."

He contended that it was only reasonable that the amendment should be adopted. He admitted that his motion was a dilatory one, but he believed that delay was desirable under the circumstances. The ratepayers would require to be satisfied that the Council were proceeding with caution, and had carefully weighed facts and figures; and how could it be said that they had done so in the absence of any facts or figures?

Mr. Beachcroft seconded the amendment. He suggested that the Finance Committee should carefully consider the whole subject before the Council arrived at any decision. He considered, also, that before any definite action was taken, information should be procured from the twenty-three boroughs in the kingdom who had purchased tramway undertakings as to the result of their experience. The Council should also learn what return they received, and, to obtain that information, the resolutions might well stand over for two months.

Mr. Bassett Hopkins contended that there was abundant evidence before the Council to show that this tramway they proposed to purchase would prove a most profitable investment. He trusted that the Council would reject the amendment. The thirty corporations in the Kingdom were perfectly content with the result of the undertakings they had purchased, because in no single instance had any desire been evinced either to retrace their steps or to repent the bargain they had made. In some cases timidity became almost criminal, and he hoped the Council would follow the dictates of common sense and adopt Mr. Benn's resolutions.

The closure was applied, and the amendment rejected by a large majority.

Mr. Antrobus moved a further amendment, that the Council, in adopting the resolutions, should agree not to work the tramways themselves. The Council had been told that the Corporations who had purchased the tramway undertakings were not anxious to retrace their steps; but they must not forget that they had been purchased on reasonable terms, and they got a good return for their money.

The amendment having been seconded,

Mr. John Burns, M.P., said the Corporation of Glasgow expended 120,000*l.* upon the construction of tramways, and in the eighteen years they had received 150,000*l.* from the company to which they leased them, whilst, in addition to a percentage of the cost of repairs and maintenance, the company had during that period paid a dividend of 8 per cent. The Corporation now decided to work the lines themselves, and secure this 8 per cent. for the community. He hoped the Council would acquire all the tramways in the Metropolis, and establish a uniform penny fare, accord humane treatment to the men, and become the medium for giving convenient traffic and vehicular accommodation to the people of this city; and not allow it in the future to be what it had been too long, an orange to be squeezed by private companies in the interest of the few and to the detriment of the many.

The closure was again applied, and the amendment rejected.

On a division on the resolutions the figures were:—For, 92; against, 24; majority, 68.

After transacting other business, the Council adjourned.

Correspondence.

To the Editor of THE BUILDER.

"THE INSTITUTE OF ARCHITECTURE."

SIR,—I am largely in sympathy with Mr. Belcher, and if I were not I should respect his opinions, but I cannot accept his methods. The composition of the Institute and its objects are defined by charter, and its routine is, for the time being, fixed by by-laws. What he and those who think with him want is something far too important to be effected by changes in names, or to be brought about by discussions as to the nature of our art or the mental qualifications of its practitioners.

The Institute exists "for the general advancement of civil architecture," and for the study of "the various arts and sciences connected therewith," the art "tending greatly to promote the domestic convenience of citizens and the public improvement and embellishment of towns and cities." The breadth of this definition is only brought out more clearly by the by-laws, which, moreover, stamp it as a professional society, admitting a very few outside members for the help they can give to it. The precautions taken before admitting a member aim at ensuring that he has been trained in some satisfactory way for the practice of the profession, that he is likely to act fairly between clients and builders, and to behave with decent civility to his brethren, even if they may not be quite up to the high standard which he has set up for himself. It is impossible for a body constituted on such a basis to ensure that each of its members shall reach the standard which every other member demands in respect of the particular branch of the profession which he lays closest to heart. If it were to seriously attempt such a task all round it would divide to the smallest society in England, and become utterly useless for its purpose. What it can do is to ensure that each candidate for membership shall reach a standard in each department of professional work which shall be reasonable and sufficient. It is pretty sure to make mistakes, but it should be open to reason, and should welcome all honest attempts at improvement. This is what I think the Institute does; but it cannot do what every individual or every group amongst its members, asks it to do, and, particularly, it cannot turn itself into something else at the instance of gentlemen whose sphere of usefulness appears to be outside its walls.

But what I more particularly wish to suggest to Mr. Belcher is that he can get all he really wants without this disturbance. What he wants is evidently the want of a few,—of a select few

It cannot be expected that the views and feelings to which he gives expression will be held by the many, until they have advanced beyond their present stage. Why should not men having common feelings and objects form themselves into a club or group within the Institute and work out their ideas in their own way? They might even consort with outside architects and might do many things within their sphere that cannot be undertaken by a body having the great variety of objects with which the Institute is charged. There is a good old rule of the Architectural Association enabling members desirous of associating for the study of any specific subjects to join together for that purpose under the sanction of the Association, and either with or without official sanction such groups might be usefully formed provided they were formed openly, were loyal to the parent body, and did not degenerate into cliques. We could afford this risk.

Why should the man who, having gone through the training which is thought suitable, finds his vocation chiefly in promoting "the domestic convenience of citizens" be denied the title of architect and dubbed a surveyor? If you exclude from the higher title every one whose designs you don't like, where is exclusion to end? A sensitive man's list of true artists would necessarily be a short one; it might dwindle to two names, with doubts about the second. Unquestionably the really original mind would be excluded from all such lists,—till, as Mr. Decher says, years of neglect had passed over his work.

The Examination is a thing much more elastic than charter or by-laws. If it is defective, as I think it to be in some respects, it is open to fair criticism. If it excludes men who can construct what they design, and are otherwise worthy, it ought to be reformed. I am afraid that any examination must exclude some whom one would like to bring in, for there are men who so shape themselves that they will pass through no mesh of any recognised gauge; but even these need not be injuriously affected by the Institute. It is rather for the Government, as representing the general public, than for the members of a professional body to say that such persons shall not be entrusted with responsible work, and this question is not likely to arise until much greater danger can be apprehended than is now threatening.

I fail to see the object of making the title of "Fellow" a distinction. The dictionary and our charter concur in making this word denote equality, and my private view is that every man whom the Institute considers fit to take the responsibility of practice on his own account, should be made equal in all respects with his seniors who can be no more than fit. If we must have distinctions they should be denoted by some more suitable name.

We are getting into a quarrel; at the end of it we shall have to sit down in peace together. My advice is that of "un vieng gentilhomme éprouvé en divers bazards nommé Echebron,"—that we sit down in peace now.

THOS. BLASHILL.

SIR.—My friend Mr. Nevill seems very angry with me, and says I have forgotten that Vitruvius requires architects to be able to decide questions of "light and air." I believe Vitruvius also says that we ought to be good musicians. But what do Vitruvius and Mr. Nevill mean by "questions of light and air?" If they mean that an architect ought to be able to see that his employer's windows are likely to be darkened by his neighbour's new building, I quite agree that an architect ought to possess that needful measure of common sense and observation. But if they mean that he is to sit as an arbitrator at five guineas a day and award pecuniary damages or compensation in such cases, I submit that that is surveyor's work and beyond his province.

All we argue for is that architecture is architecture, and surveying is surveying,—that an architect's work has nothing to do with ground leases, building speculations, arbitrations, valuations, or even quantity-measurement, all which belong to the surveyor.

I fail, however, to see why Mr. Nevill should be angry and accuse us of wanting to put him into iron bonds to which the restrictions of the Institute are nothing. We do not want to put either him or anyone else into iron bonds. As I said in my former letter, we only ask to be

let alone, and not to be put into bonds ourselves by Mr. Nevill and his friends, be they ever so silken. If Mr. Nevill likes surveying, by all means let him follow it if he thinks he can combine it with architecture. We shall not prevent him; but I feel sure that were he to do so we should not have such good work from him in the future as he has given us in the past.

T. G. JACKSON.

MR. SCOTT-MONCRIEFF'S PROCESS FOR TREATMENT OF SEWAGE.

SIR,—In your interesting "Note" upon the experiments I have been making at Ashted upon the treatment of sewage by the intervention of a large colony of micro-organisms, I think you have overlooked the important factor of rapidity which is characteristic of the process. What occurs is more like the action of a ferment, such as yeast, than of the slower changes which occur in the production by bacteria of "ptomaines," "enzymes," &c. If these poisons, which are the characteristic products of putrefaction in meat and especially in fish, were to occur with the same rapidity in the larder as the change which takes place in a "Cultivation filter bed" among its organic refuse, meat and fish could only be used, after their preservation by salting, the moment life was extinct. Among the numerous products which I soon hope to discover in my laboratory I do not think it is at all likely that any poisons which are likely to be found for their development are likely to be found. The effluent I obtain is, after all, nothing more than the normal product of Nature which has found its way through the watercourses to the sea since the existence of animal life on our planet. Any attempt to arrest such a universal process must end in obvious failure, although the use of disinfecants and chemical processes were multiplied a thousandfold. It appears to me that my experiments point to the practicability of utilising these natural processes so as to make them do vastly greater, more concentrated, and more beneficent work than they have hitherto done. It is certainly necessary to take all precautions such as your note suggests, but I am strongly impressed with the opinion that the best way of disposing of the effluent which I obtain is by its assimilation by vegetation. Meantime this effluent is produced without the use of chemicals or tanks, and practically without sludge. All this is certainly a step in the right direction.

W. D. SCOTT-MONCRIEFF.

AN ANCIENT PAINTING.

SIR.—With reference to the ancient painting discovered at Wenaston Church, Suffolk, which is noticed in the *Builder* (p. 239) last week, I should like to hazard the following conjecture, dangerous though it be to say without seeing. It is this, that this painting on oak boards of the Last Judgment either was placed over the chancel-arch, against the east wall of the nave, or much more probably that it filled in the chancel-arch between the rood-screen and rood-loft (if there was a loft) and the arch above it. So that the local paper was probably right in the main when it spoke of the painting "forming the upper part of the chancel screen," for it would no doubt rest on the loft. The position of the crucifix, so clearly marked out, and the "two bottom side panels" being apparently formed by the carved images of patron saints (St. Mary and John certainly), as well as the subject,—the Doom,—so often painted in the same place, seem to me to make my conjecture very probable. I have drawn attention to a similar feature in Coates-by-Stow Church. On the oak boards which shut off the chancel-roof just to the east of the rood-loft are remains of paintings; on the north side a figure with a nimbus can be dimly discerned; and on both sides are flowers with long leaves, which most likely are lilies. Pugin gives a view of a somewhat similar arrangement at Urnes, near Bergen (now destroyed, I believe), but I have not succeeded in getting any more instances. The reason of their scarcity is obvious; when the rood-lofts came down, almost of necessity these boards came down too, especially as they were so adorned with painting. Whatever the explanation, this at Wenaston is a most interesting discovery.

E. MANSSEL SIMPSON.

P.S.—Mr. Keyser, in his valuable work on Mural Decoration (S and A Department), notes that at Mitcheldean, Gloucestershire, on a set of panels above the chancel-arch, is the Day of Judgment and scenes from the Life of Our Lord, of the time of Edward IV. Also at St. Michael's, St. Alban's, is the Day of Judgment, with crucified

* Lincolnshire Rood-screens and Rood-lofts. Assoc. Archit. Societies Reports and Papers. 1390.

Saviour in the centre, over the chancel arch, partly on a panel filling in the head of the arch, while over the rood-loft in Snettleton Church, Norfolk, is a defaced panel painting of the Last Judgment. I may add that the Scandinavian example from Pugin has nothing to do with the painting of the Doom; it only resembles the general arrangement at Coates and elsewhere.—E. M. S.

The Student's Column.

CONCRETE.—XV.

SAND (continued): ANGULARITY.

THE sharper the sand is the better. The angularity of the grains helps to bind them together to give them a sort of bond. The advantages of angularity are clear evident in surfaces subjected to much wear; paving; from these, round smooth grains are detached much more easily than irregular sharp grains. Sand obtained by crushing hard, compact rock, is very good in this respect; sea river sand is not so good, but varies very much according to the place where it is obtained.

Experiments made by Mr. Kinipple on mortars composed (1) of 1 part Portland cement and 1 part sand obtained by crushing sandstone in a Blake's crusher, and (2) Portland cement and pit-sand in equal proportions, showed the former to be over 50 per cent. stronger than the latter. This was doubtless due to the superior angularity, cleanliness, and coarseness of the crushed sand.

4. *Hardness*.—There are some sandstone limestones, and even igneous rocks, which crumble almost at a touch, and the grains which are soft and easily crushed. These ought not to be used. As a rule, the harder the rock the better will be the sand obtained from it. The grains, however, ought not to be too smooth and round, as we have already stated.

5. *Durability*.—It would be folly to make concrete walls with an aggregate which would soon succumb to the action of the atmosphere. There is, however, little fear of any natural sand being deficient in durability, but the sand obtained by crushing certain limestones and sandstones, which weather badly as building stones, ought to be carefully examined before its use is permitted. As a rule, a hard-grained sand will prove durable.

Substitutes for Sand.—It is not always the natural sand, or sand crushed from natural rock, can be obtained. Ground brickbats, pottery, burnt and ground clay, slag-sand, coke-breeze from gasworks, smithy-ashes, &c., may be used as substitutes. The ground brick-bats, if well-burnt and free from dirt, old mortar and liches, make good mortar. Clay should be thoroughly burnt or it will irretrievably spoil the mortar or concrete in which it may be mixed. The dust of brick-bats and burnt clay is considered to confer a small amount of hydraulic energy on fat limes. Coke-breeze is not to be recommended for use in walls and foundations on account of its porosity and weakness. Smithy-ashes and foundry-sand have been recommended by some authors but do not always give good results. Soot ought to be avoided.

A series of experiments of considerable interest were made by Lieutenant Innes, R.E., and read to the Institute of Civil Engineers. The briquettes were made of Portland cement and sand, or substitute for sand, in the proportion of 1 to 2, and were kept in water until tested. All grains exceeding one-twelfth of an inch were removed from the various sands, &c., but apparently no attempt was made to remove the fine dust in any of them. (See table, p. 287.)

The mortars made with smithy-ashes and clay-ballast were apt to shrink and crack. Lieutenant Innes's experiments showed, therefore, that the clay-ballast gave the best results, and the other sands, &c., followed in this order:—Portland stone-dust, ordinary coarse sea-sand, rough pit-sand, smooth pit-sand, drifted sea-sand, and, lastly, smithy-ashes. If the table be considered in the light of our remarks about the essential characteristics of good sand, the differences between the various sands and substitutes will be easily explained.

AGGREGATES.

The number of different materials which have been used in concrete is very large. We may mention gravel, shingle, broken stone of various kinds, broken brick and pottery, burnt clay and shale, coke-breeze, slag, shells. The

* Proceedings I.C.E., Vol. xxxiii., 1870-1.

TABLE XIX.
Tests of Various Sands, &c., and Cement.

Nature of Sand, &c.	Voids per cent.		Shrinkage per cent.	Grains above 1/16 in.	Tensile Strength in lbs. per sq. in.				
	Dry.	Wet.			Three weeks.	Proportional value of Sands.		Three months.	Proportional value of Sands.
						Value of Sands.	Value of Sands.		
Neat cement	—	—	—	—	450	—	520	—	
Sea Sand, roughish and un-even grain, chiefly siliceous, clean	38	34	6	94	140	52.4	249	70.1	
Sea Sand (drifted), siliceous, clean	43	36	11	8	60	22.3	193	54.3	
Pit Sand, containing small shells, &c., grains of unequal size, siliceous	32	19	16	15	103	40.1	248	69.8	
Pit Sand, grains smooth and uniform, siliceous, clean	41	34	11	76	94	34.9	175	49.8	
Portland Stone Dust, rough and whitish, grains rough and irregular, clean	46	34	18	56	165	61.3	254	71.5	
Smiddy Ashes, containing much unburnt coal-dust, grains rough and irregular	64	52	25	56	38	14.1	91	25.6	
Clay Ballast, burnt and ground, pale brick-red colour, rough, uneven grain, containing much dust	50	40	17	40	269	100	355	100	

lection of an aggregate is largely influenced by the locality in which the work is required, and by the use to which the concrete is to be put. The aggregate which is most easily available and most economical is usually employed, and would be a waste of money to specify burnt aggregate for a building on the site of which stone suitable for breaking could be obtained, while the clay would have to be brought there at considerable expense, for any reasonable inferiority of aggregate can be remedied by using with it proportionately larger quantity of cement.

The remarks about the cleanliness, angularity, hardness, and durability of sand may be applied with equal truth to the aggregates. But a little further information about the more common kinds of aggregate will be useful.

Gravel and Shingle.—Ordinary gravels contain a considerable quantity of sand, varying, perhaps, from one-third to one-half the total volume. This may advantageously be sifted out, so that the several ingredients of the concrete can be accurately measured. Gravel from pits and from sluggish streams ought to be washed before being used, as the former will probably contain clay in considerable quantities, and the latter may be coated with fine mud or slime, or may contain an excessive amount of very fine sand; but gravel and shingle from some parts of the sea-beach and the beds of rapid streams do not need further washing. For rough concrete in ordinary undulations, &c., gravel forms a good and economical aggregate, as it may be used in any instances with little or no preparation. The larger rounded pieces in shingle, &c., should be broken, so as to give them a certain amount of angularity, in order that the cement may adhere to them more firmly, and that they may be wedged and bonded together. Shingle, &c., which contains large irregular pieces, makes stronger concrete than that consisting entirely of smaller pieces rounded by attrition. Opinions differ as to the value of gravel and similar material as an aggregate. Some persons go so far as to say that it is the best of all aggregates, while others loudly condemn it. The fact is that such material, from its hardness and durability, is useful in foundations and walls, where the concrete is subjected mainly to compression; but in floors and other places where it is subjected to transverse stress, it does not form a good aggregate, because of its flat weight, the smoothness and roundness of stones, and the small resistance it offers to a action of fire.

Of two kinds of gravel or shingle, that which is the best, other things being equal, which has the smallest interstices; for in this case a smaller quantity of sand is required with the cement, and this is important because the length of concrete depends largely on the length of the mortar (i.e., the cement and sand) in which the gravel, or other material, is bedded.

The gravel obtained from the Thames, and generally known as Thames ballast, is an exceedingly good aggregate for foundations and walls, being usually fairly clean and irregular, and containing sand of good quality. All gravel is more or less rounded by attrition, and

this of course is a disadvantage. Usually, also, it is not porous enough to admit of the best adhesion of the cement to its surfaces.

Broken Stone.—A great many kinds of stone have been used as aggregates in concrete, granite and other igneous rocks, flints, sandstones of various kinds, limestones, &c.

Igneous Rocks.—Igneous rocks are largely used as an aggregate, especially for concrete exposed to much wear, as in the facing of breakwaters, dock-walls, coping, and other sea-works. They are also extensively used in the manufacture of artificial stone, paving, &c. Messrs. W. B. Wilkinson & Co. use granite as an aggregate for their concrete paving and flags. Stuart's "Granolithic" paving contains the same material. The paving, &c., manufactured by the Patent Victoria Stone Co. and by the Croft Granite Brick and Concrete Co. are specially-prepared concretes of Portland cement and syenite from Leicestershire quarries. The Imperial Stone Paving also contains crushed granite.

Igneous rocks may be classified as *Granitic*, *Trappian*, and *Volcanic*, but no examples of the last occur in the British Isles. Ordinary granite consists of crystals of felspar, quartz, and mica, and is found extensively in Scotland. There are several varieties, such as syenite, and syenitic granite (containing hornblende, and quarried in Leicestershire, Guernsey, &c.) and porphyritic granite (containing large and independent crystals of felspar in addition to the small ones contained in the general mass of the rock, and quarried at Shap in Westmoreland and at several places in Cornwall and Devonshire).

Trap-rocks are of many kinds, the more crystalline varieties, such as basalts and greenstones (or whinstones), being most suitable for aggregates in concrete; some of the earthier varieties confer a certain amount of hydraulic energy on limes and cements. The Giants' Causeway in Ireland, and Fingal's cave in Staffa are well-known examples of basaltic rocks, and other trap-rocks are found in Derbyshire, Cumberland, North Wales, &c. Mr. Thomas Dyke states that whinstone withstood the grinding-test for wear much better than either granite or shingle, blocks of each being applied under the same pressure to the face of a revolving grindstone.

Granitic and Trappian rocks of various kinds can be obtained from many quarries, broken by machinery into various sizes suitable for concrete. They form an excellent aggregate for foundations, walls, and paving, being hard, angular, and durable. For floors their weight is a disadvantage, and so also is their great liability to crack or disintegrate under the action of fire.

Flints.—Flints are lumps of grey or black siliceous, usually in horizontal layers, in beds of chalk. They are of all sizes up to a foot or more in diameter, and, when dry, are extremely hard and refractory. Owing to their glassy surfaces they do not form one of the best of aggregates, but broken into suitable sizes they can be used in foundations and walls; their great weight, and their tendency to "fly" under the influence of fire, render them unsuit-

able for floors. If the flints have been taken from land under cultivation, they ought to be washed before being used.

Sandstones.—It is impossible to mention all the sandstones which are suitable for concrete. A few general observations must suffice. Those sandstones which yield durable building stones will usually yield good aggregates, while those which are friable and which favour the growth of vegetation upon them will not. Sandstones vary considerably in weight and in strength, and this must be taken into consideration; the strongest and heaviest may be used in foundations, walls, and paving, and lighter varieties may be used in floors. All sandstones are apt to crack and split under the influence of heat, although they are not as much affected by it as are granites and limestones. It is not wise, however, to use them in floors which are intended to be fire-resisting. The degree of porosity of the stone has also an influence on the ultimate strength of the concrete; the dense stone which splits into thin layers with smooth mica surfaces, such as Yorkshire flags, will probably not yield as good concrete as a rather more porous rock. But care must be taken that the stone, especially the porous varieties, is well soaked with water before the cement is mixed with it, otherwise the aggregate will absorb the moisture from the cement, and the hardening of the latter will be prematurely stopped.

Old building materials often furnish a convenient and economical aggregate, but, as a rule, they will be much improved by being washed after they are broken.

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GENERAL BUILDING NEWS.

PROPOSED "VARIETIES" THEATRE.—A site has been cleared on the western side of St. Martin's-street, Leicester-square, for the building of a new theatre, or rather music-hall, from the designs of Mr. G. H. Greatbach, architect. The site, being about 11,000 ft. superficial, is secured upon an eighty years' lease, at a ground-rent of 1,300l. per annum, and the total cost for the theatre is estimated at 57,000l. Entrances and exits will be made in St. Martin's, Whitcomb, and Blue Cross-streets.

SCHOOL CHAPEL, FOLKESTONE.—On Sunday last services were for the first time held in the new school chapel which has been built at the Grange, Folkestone. The walls are of red local brick throughout, with corbels, copings, and crosses of Morley red stone. The roofs are of pitch pine, and are covered with local tiles. The seats, which are in oak, face east and west—the apex of the chapel facing north—and are arranged to accommodate seventy-two boys, six masters, and thirty-two visitors. The architect is Mr. Arthur Bloomfield Jackson, of London, under whose direction the work has been carried out by Mr. H. R. Mercer, of Folkestone.

RESTORATION OF ST. ANDREW'S CHURCH, FOXTON.—The nave and aisles of the Church of St. Andrew at Foxton, near Market Harborough, are now undergoing restoration. The architect for the work is Mr. William White. The church is also about to be restored. The architect for this section of the work is Mr. H. Hardwicke Langston.

MECHANICS' INSTITUTE AT FELLING, DURHAM.—On the 22nd ult. Sir Charles M. Palmer, Bart., M.P., opened the new Mechanics' Institute at Felling. The foundation-stone of the building, the exterior of which is of stone, was laid in February last by Alderman Lucas. On the ground floor there are a billiard-room, a reading-room, a smoke-room, and lavatories, &c. On the upper floor there are a public room, 39 ft. by 24 ft., a club-room, a library, and an ante-room. Behind the building there are two living rooms for the caretaker. The building has been erected to the plan of Mr. Miller. Messrs. Wallace & Wilkinson have had the general contract; Mr. Faid, the plumbing work; Mr. Sisterton, the painting, &c.; and Messrs. Emley & Sons, Newcastle, have supplied the fittings.

SCHOOLS, ECCLES.—The foundation-stone of St. Andrew's New Schools, in Barton-lane, Eccles, Lancashire, was laid with Masonic honours on the 24th ult. On the ground-floor of the new building is the infants' department, which will comprise a schoolroom 43 ft. by 25 ft. 6 in., and two large class-rooms, also a cloak-room, and a room for the head teacher. There is also on this floor a room 54 ft. by 26 ft., to be used for mission and general parochial purposes. The first floor is taken up wholly as a mixed school for boys and girls. It comprises a room 54 ft. by 43 ft., and five large class-rooms, one of them being furnished for teaching cookery. The large room is readily divisible by movable partitions. A portion of the building on the ground floor has been set aside for use as a young men's institute. The whole building will be warmed with hot water, and every room is provided in addition with an open fireplace. There will be two large playgrounds, separated

from each other by the whole length of the building, containing covered sheds for shelter. The accommodation thus provided for is 743 school places. The contract for the whole of the works has been let to Messrs. W. Brown & Son for the sum of 5,793*l.*, and the work is being carried out from the designs and under the superintendence of the architect, Mr. Henry Lord, of Manchester.

NEW CHURCH, HARDEN, YORKSHIRE.—On the 24th ult. the new Church of St. Saviour, in the village of Harden, was opened and consecrated by the Bishop of Ripon. The church is situated on a sloping site on the east side of the Harden Board School. The style adopted is Early English. There is a nave, chancel, and north aisle, also a vestry, and the main entrance is by a porch at the west end of the building. Provision is also made for a tower. The interior sittings are of pitch pine; the seats are open benches, and there is accommodation provided for 250 persons. The building has been erected by Messrs. Joseph Foulds & Brothers, of Bingley. Messrs. W. R. & R. Atkinson, of Bingley, have executed the joiners' work; Mr. T. Nelson, Bradford, the sittings; Mr. Harrison, Keighley, the plumbing; Mr. Josiah Pickles, Bingley, the plastering; and Mr. W. Walker, of Bingley, the painting. The total cost of the edifice is about 2,300*l.* Messrs. T. H. & F. Henley, of Bradford, have been the architects for the new building.

CRICKET PAVILION, EDINBURGH.—On the 22nd ult. the Edinburgh Peas & Gull Cricket Club granted the application of the Glasgow Cricket Club to erect a new pavilion on their ground at Raeburn-place. The pavilion will cost nearly 3,000*l.* The lower story of the building will be constructed of stone and the upper portion of brickwork, faced with cement and open timber work. The main building will occupy a site immediately behind the existing structure, and will measure 58 ft. 6 in. by 48 ft., irrespective of a sloping grand stand, which will project about 40 ft. forward from it, and seat about 250 persons. On the ground floor will be a dressing-room, measuring 40 ft. by 20 ft.; a professionals' dressing-room, a bed-room, parlour, and large kitchen for the caretaker, and lavatory accommodation. Entrance to the upper or main floor can be had either by an inside stair or by the inclined gangway which runs up the centre of the grand stand. This gangway gives access to a verandah, in the centre of which under a porch is the entrance to the pavilion hall. This hall, which will have an open timber roof, will measure 50 ft. by 27 ft. 6 in. On one side of it will be a committee-room, and on the other side a dressing-room. On the roof there will be sitting accommodation for about 200 people, the access to this other grand stand being obtained from a square tower, the pinnacle of which will be 60 ft. high. The roof of the tower and of the main building, so far as not set apart for sitting accommodation, will be treated in red tiles. The designs are by Messrs. Cunningham, Blyth, & Westland, civil engineers, Edinburgh.

NEW CHURCH, HORRABRIDGE, DEVONSHIRE.—On the 19th ult. the foundation-stone of a new church for the parish of Horrabridge was laid by Sir Massey Lopes. The new church, designed by Mr. G. H. Fellowes Fryne, of London, will be in the Perpendicular style, and cruciform in shape, with west entrance facing the Horrabridge-road, and two other entrances at the west end of north and south aisles. Gabled transepts are placed north and south, and there will be a niche at the junction of nave and chancel. The altar will be visible from all parts of the church, being raised seven steps from the nave level. The east window will be of five lights, and arches north and south of the chancel will open into the vestry and organ-chamber respectively. The nave and aisle roofs will be open-timbered, and the chancel roof is wagon-headed. Two arches in the north and south walls of the nave open into small aisles. The building will be of local stone, with Doubling freestone for external dressings and windows, and Bath stone in random square work, pointed, with red for internal dressings. Seating accommodation will be provided for 300 persons. Mr. Fuge, of Horrabridge, is the contractor for the erection of the church, and Mr. C. E. Perkins, of Plymouth, has been appointed clerk of works.

HOME FOR WAIFS AND STRAYS, WASHINGTON, DURHAM.—On the 3rd inst. the new schools just erected in connexion with Dame Margaret's Home for Waifs and Strays, Washington Hall, were opened by Sir Lowthian Bell, Bart. The schools have been constructed on the site of the old laundry, from plans by Messrs. Plummer & Barrell, architects, Newcastle. There are two rooms, one being 40 ft. by 18 ft., and the other 28 ft. by 19 ft., each being capable of extension. Cloak-rooms are provided as well as conveniences and a playground. Mr. Thos. Hunter, of Washington, was the contractor for the work.

EXTENSION OF BOARD SCHOOL, OLDHAM.—On the 27th ult., the Rev. J. P. Rountree, M.A., Chairman of the Oldham School Board, opened the new extension of Westwood Board School. The extension consists of the provision on the ground floor of two class-rooms, each 20 ft. by 17 ft. 6 in., and a cookery-room, 25 ft. by 20 ft., with scullery or pantry thereto, the whole entered from a corridor at the end of the infants' school and class-rooms,

and which also gives access to the whole of the buildings throughout. On the first floor the extension consists of two class-rooms, each 22 ft. 6 in. by 20 ft., and a manual instruction-room, 25 ft. by 20 ft., the whole entered from a central passage, by the one below. The class-rooms are divided by folding-screens. At the end of the corridor a staircase for girls, from the first floor, has been erected, and gives access to the girls' playground. The whole of the new portion has been celled. The new portion is fireproof throughout; all the windows are covered with wood blocks, and the wood-work is of pitch pine. In addition to the above a teachers' room has been built. The roof of the infants' class-rooms has been altered, and a continuous side-light has been inserted. The boys' stairs having become worn and dangerous, they have been taken down and replaced with stairs of easier pitch and solid construction. The girls' and boys' offices in the yards have also been reconstructed; and in two class-rooms the light has been increased by enlarging the windows and providing extra roof light. The heating and ventilation of the school have also been attended to. The work has been done from plans, &c., prepared by Messrs. Winder & Taylor, architects, Oldham. The architect are Messrs. E. Whittaker's Executors, Oldham.

NEW CHURCH, WALSALL.—On the 19th ult. the memorial-stone was laid of the new church of St. Paul, Walsall, which is being erected on the site of the late church of St. Paul. The new church will be in stone from the designs of Mr. Pearson, R.A. Its total cost is estimated at about 9,000*l.*

NEW HOSPITAL, KILMARNOCK, Ayrshire.—The new small-pox and cholera hospital, situated on the Bellfield estate, about two miles from the Cross of the Kilmarnock, has just been completed. The hospital proper consists of two wards, a male and a female, for six patients each. The dimensions of each ward are 27 ft. 6 in. by 22 ft., walls 14 ft. 6 in. in height. Attached to each ward is a lobby or corridor leading to lavatories, bath-room, &c. Between the wards is placed a ward scullery and nurses' room. The administrative portion is connected to the wards by a corridor, 15 ft. wide, but at the same time detached from the hospital proper. This portion gives nurses' sleeping-rooms, medical attendant's room, lavatory, &c., also kitchen and room and kitchen for janitor or keeper. The wards internally are lined with white enamelled bricks, the roofs with open timber, and the whole woodwork varnished. The out-buildings consist of washhouse, laundry, unwashed clothes disinfecting room, furnace apartment, and mortuary. Mr. R. S. Ingram, architect, provided the plans, and the contract was undertaken by ex-Baillie Calderwood. The entire cost is about 1,200*l.*

DEAF AND DUMB SCHOOLS, PRESTON.—The foundation-stone of the North and East Lancashire Deaf and Dumb Schools, Preston, was laid on the 1st inst. by the Earl of Lathom. The building will provide accommodation for 50 children. There is provided on the westerly side a boys' wing with a day-room 23 ft. by 15, teachers' room, being placed at either end. In the event of extension these latter will be removed, and the length of the room will then be 35 ft. Dormitories are arranged with bathrooms, &c. A wing for the girls is placed at the east side of the buildings. The governor's residence is placed in the centre of the buildings, and there is also a board-room, together with a sick ward and a block where the administrative work of the schools will be carried on. The plans have been prepared by Messrs. Somes & Green, architects, of Blackburn, and the present cost of the work is estimated at 5,200*l.*

TECHNICAL SCHOOLS, ASHTON-UNDER-LYNE.—On the 3rd inst. the new technical schools and free library, which have just been completed for Ashton-under-Lyne, were opened. The building is in the Early English style, and has been erected from designs prepared by Messrs. John Eaton & Sons, architects, Ashton, at a cost (including fittings) of 15,000*l.* In the free library section provision has been made for accommodating the 15,000 volumes which constitute the present library at the Town-hall, for a general reading-room, reference library and reading-room, and ladies' reading-room. The whole of the first floor (over the library), which is devoted to art, is divided into class-rooms, six arranged round a central gallery that when required for the purposes of an art exhibition, which it is intended to hold occasionally, it would be possible to complete the circuit of rooms without going out of the gallery.

TECHNICAL SCHOOL, SALFORD.—On the 1st inst. the foundation-stone of a school for providing technical instruction in Salford was laid by Mr. Alderman B. Robinson, ex-Mayor of the Borough and chairman of the Technical Instruction Committee. The building, which is estimated to cost about 50,000*l.*, is being erected at the south-west extremity of Peel Park, and is set back a short distance from the street, stretching its main front northwards in the park for more than 300 ft. It is being executed in red brick and terra-cotta. It will rise 80 ft. or 90 ft. from the ground. The various class and lecture rooms will accommodate 2,200 students. In addition to these, a large room, seating about 600 persons, is provided behind the main building, but close to the central entrance.

This will be made use of for popular scientific lectures and entertainments, and for musical performances. The building will comprise various rooms necessary for the teaching of physics, mechanics, engineering, and the handicrafts, including joinery, turnery, wood-work, plumbing, building, construction, engineering, drawing, modelling, freehand drawing and painting, &c. Dining, day rooms, and library will be provided for the use of the students, and provided for the various secretaries, committees, and teachers. Mr. Henry Lord, of Manchester, is architect, and the foundations are being put in by Messrs. Winder & Toft, builders, also of Manchester. The warming and ventilation of the building will be by the Blackman-Smead method.

SCHOOL OF ART, CARMARTHEN.—On the 2nd ult. a new school of art was opened at Carmarthen. The new building is in the modern Renaissance style, and faces the westerly entrance to St. Petri Church, in Church-lane. It is built of red Brecon water bricks, the mouldings and cornices being Ruabon bricks, and the dressings of Bath stone. Accommodation is provided for seventy pupils entering through a hall, laid with tessellated tiles, and divided by an arcade supported by fluted or moulded pilasters, an elementary room, 37 ft. by 20 ft., and a modelling-room, 15 ft. 6 in. by 19 ft. 6 in. are reached on the ground-floor. The rooms are about 16 ft. high. Lavatories for the boys open from the hall. The landing has pilasters a series corresponding with those in the entrance hall. The upper floor contains a room 37 ft. by 20 ft., and a master's room, 15 ft. by 12 ft. The former will be divided by a curtain or movable partition, and the divisions will be used as painting and antique room respectively. On the upper floor there are also lavatories and a ladies' cloak-room. Artificial light is provided by pendants from the ceiling having Venetian lights. The work has been carried out by the contractor, Mr. T. Morris, Carmarthen, from the designs and under the superintendence of Messrs. G. Morgan & Son, architects, also of Carmarthen.

MONASTERY, GLASGOW.—The new monastery retreat which has been erected in Parson-street, Glasgow, for the Passionist Fathers, was opened on the 25th ult., by Archbishop Eyre. Adjoining the church, and built in Gothic style, with a red sandstone front, the monastery consists of four stories and contains numerous apartments. Accommodation has been found on the basement for a parish library, and the first floor contains a library for the use of the clergy, a refectory, a community-room, and three public reception-rooms. On the second and third floors are sixteen bedrooms, and on the third flat is also built an oratory. The building has been designed by the Rev. Father Osmund Cook, of Paris, and has cost 4,000*l.*

NEW CHURCH, BANGOR.—On the 22nd ult. the Bishop of Bangor dedicated the newly-erected Church of St. Cross, situated at Maes-y-groeg, Llanllechid, near Bangor. The church and site, costing about 3,000*l.*, are the gift of Lord Penrhyn. The church is built from the designs of Mr. T. D. Atkinson, Cambridge, by Mr. Owen Morris, Carnarvon, and Mr. Newling of the Penrhyn Estate. It consists of nave, chancel, vestry, and porch, and is built of Anglesey Limestone, in the Norman Twelfth-century style. It is seated for 200 people.

CHURCH FITTINGS, ST. MICHAEL'S, BOURNE MOUTH.—New carved oak choir stalls, executed by Mr. J. Sharp, of Westbourne, and a wrought iron altar and gate to chancel of St. Michael's Church, Bourne-mouth, executed by Messrs. Singer, of Frome, were used for the first time on St. Michael's Day. They have been made from designs by Mr. Reginald G. Pinder, F.R.I.B.A.

SANITARY AND ENGINEERING NEWS.

THE WORSHIPFUL COMPANY OF PLUMBERS.—At the quarterly meeting of the Court held at Guildhall on the 30th ult. the following officers were severally sworn into office for the year ensuing:—Master, Mr. Alderman Stuart Knill (Lord Mayor Elect); Warden, Mr. W. H. Bishop; Rentor-Warden, Sir Philip Magnus, B.A., B.Sc.

FRONTED WATERWORKS EXTENSIONS, LEEDS.—On the 4th inst. Mr. Thomas Codrington, one of the Inspectors of the Local Government Board, opened an inquiry at the Leeds Town Hall with reference to an application by the Leeds Borough Council County for sanction to borrow 131,000*l.*, of which 100,000*l.* is required for waterworks extensions and 31,000*l.* for general improvements. The Town Clerk (Mr. J. Harrison), in laying before the Inspector the reasons for the application, stated that in February, 1890, Mr. Codrington held an inquiry upon the application of the Corporation for sanction to borrow, among other moneys, a sum of 200,000*l.* for waterworks purposes authorised by the Provisional Order of 1888. It was afterwards considered that it would be sufficient to apply for 100,000*l.* only, and upon the Inspector's report the necessary sanction of the Local Government Board to the borrowing of that amount was granted. Sanction was now sought for the borrowing of the remaining 100,000*l.* The

corporation had provided a system of waterworks at the consumption of water had so largely increased that further works were necessary. It is estimated that the average daily consumption of 585,000 gallons, whilst in 1891 it had reached 2,945,000 gallons. The 100,000, which it has now sought to borrow was intended to be applied in the ordinary and necessary extension of mains arising out of the increased demand for water, in the extension of the Epping reservoir, and reconstruction of the Moorfoot, in providing a new service-reservoir at Harehills, and other necessary and consequential works. With regard to the £1,600, required for general improvements, the money would be needed for the purchase of land, the payment of compensation and costs for buildings, drainage, flagging, and paving, and sewerage in different parts of the borough.—The Municipal Surveyor (Mr. T. Hewson) explained in detail the various works in respect of which the present application was made.—The Inspector afterwards dealt with the details of the proposed improvements. He will report in the usual course.

LOUGHTON SEWAGE WORKS.—On the 28th ult., the members of the Epping Rural Sanitary Authority, together with the Loughton Sanitary Committee, and representatives from Buckhurst Hill, Woodford, and the neighbourhood, met at the Loughton Sewage Works to examine the International process of sewage purification there at work. Mr. Egan, the Engineer to the Epping Rural Sanitary Authority, in explaining the works to the company assembled, stated that the sewerage of Loughton was commenced in 1879, when 5 acres of land were purchased, upon which the sewage, after deposition of the grosser solids in tanks, was allowed to flow for the purpose of intermediate filtration. The land was underdrained, and the sewage from the settling-tanks passed through it. This answered fairly well for a time, but ultimately the effluent from the land became most unsatisfactory, and other steps had to be taken to prevent pollution. In 1885 it was resolved to improve this state of affairs, and also to extend the sewerage system to the northern part of Loughton, and after many schemes of sewage purification had been considered, it was decided to adopt the use of ferrous for precipitation, followed by filtration through polarite beds, instead of buying more land, especially as the land treatment had altogether failed. The entire scheme includes about 16,000 yards of sewers, and stands in the drainage, the raising of about 250 yards of the main outfall sewer, eight automatic flushing-tanks, and the necessary man-holes, lamp-holes, and ventilating columns. The total cost of the drainage scheme and sewage purification works, including the land, was under 14,000. The present population is about 5,000, but the purification works are fitted to be capable of dealing with the sewage of a much larger population. The Chairman of the Epping R.S.A. (Mr. G. Johnson), in speaking of what they had that day seen, remarked that when the process was first proposed for Loughton, he was very sceptical about it, and it was mainly due to his instrumentality that a sand and gravel filter was laid, for the purpose of comparing the different methods of dealing with sewage, but he was, very pleased to be able to tell them that the International process had proved a great success, and that they were about to convert the sand filter into a polarite one, being convinced of the immense superiority of polarite over sand, and that the use of polarite was real economy in the end. Mr. Egan, the Engineer, confirmed the remarks of the Chairman, and said he was convinced that in adopting this process, they had at a small outlay secured the best system of sewage purification.

NEW WATERWORKS, HIGHCLERE PARK, NEWBURY.—The waterworks on the estate of the Earl of Carnarvon at Highclere Park, which have been in process of construction for some time, were put to a practical test on the 23rd ult., particularly as regards their efficiency in case of fire, and for this purpose the Newbury Volunteer Fire Brigade attended with their steam engine. The works have been designed and carried out by Mr. Richard Raveau, of Newbury. The pumping station is about two miles from the reservoir, and the water supply is obtained from springs and collected into an underground tank, and from thence into one above ground, and it is from the latter that the power for working the hydraulic ram is obtained. The fire-main consists of a continuous flow principle, and will supply the Castle, stables, and flower-gardens, as well as the dairy and the home farm. The reservoir, which is on Siddow (or Siddon) Hill, is capable of holding 125,000 gallons, and its height above the ram is 400 ft., and above the flagstaff tower of the castle 30 ft. It is constructed of concrete, and has a flat covering of the same material. The fire-main connected with this reservoir is laid completely round the exterior of the castle, and hydrants are placed so as to connect the hose in case of fire. A fire-main runs up through the centre of the building inside, with hydrants on each floor, and 60 ft. of hose, with branch pipe attached to each. The water is forced through two miles of rising main from the ram to the reservoir.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, INGWOR CHURCH, YORKSHIRE.—A large stained-glass window has just been placed in Ingwor Church, to the memory of the late Mr. John Wright and his wife, by three of their children. The window illustrates the Good Shepherd, the Good Samaritan, and the Last Piece of Silver, placed in the upper, middle, and lower spaces respectively. Each subject is surmounted by canopy work. The window is from the studio of Messrs. Powell Brothers, of Leeds.

MEMORIAL TO THE LATE DR. LIGHTFOOT.—It has now been definitely decided that the first portion of the memorial to the late Dr. Lightfoot, who died in December, 1889, shall be unveiled by Durham Cathedral on October 20. The memorial includes a recumbent effigy of his Lordship to be placed in the chancel of the Cathedral at Durham; and, in addition, the restoration of the Chapter-house of the Cathedral. The cenotaph will be unveiled by the Earl of Durham, the Lord-Lieutenant of the county. The effigy of his Lordship was partially executed by the late Sir Edgar Boehm, who died whilst the work was in progress, and its completion has been intrusted to Mr. Alfred Gilbert, A.R.A.

MEMORIAL WINDOWS, ST. BRUCEADE CHURCH, KIRKCALDY.—Three memorial windows have just been added to St. Bruceade Church, Kirkcaldy. The first commemorates Patrick Don Swan, for many years Provost of the town. The design is by Mr. Burne-Jones, and it has been executed at the works of Mr. Morris. Incidents in the life of Moses furnish the theme of both compartments. The opening next in the church is a memorial lately finished of Provost Beveridge. The subject is Christ pointing out Nathaniel to the two disciples as the Israelite without guile. The third window is in memory of Mrs. Stocks, a member of the congregation.

FOREIGN AND COLONIAL.

FRANCE.—Seven years ago the State bought the Hôtel de Chimay, on the Quai National, with a view to enlarging the Ecole Nationale des Beaux-Arts. Now the alterations are nearly complete, and the Administration des Beaux-Arts hopes to be able to open them at the end of the month.—It is announced that the celebrated Spitzer collection is to be sold next April and May. The auction, which will be held in the hotel in which the collector lived, will be preceded by exhibition, the proceeds of which ought to be reserved for the benefit of the future treasures of museums.—M. Nénot, architect of the Sorbonne, is about to demolish a part of the old buildings which line the Rue St. Jacques, where the façade of the new buildings is to be placed. In order that the scientific work of the Faculté shall not be interrupted a large amphitheatre is to be built in the large Court of Honour. It will be 18 metres wide and 15 metres long, and will be made entirely of iron and bricks.—At the Musée Guimet an interesting collection has lately been inaugurated. It consists of documents collected by M. Jacques de Morgan, Director of Egyptian excavations, during his late archaeological mission in Armenia and Persia. This exhibition comprises some curious specimens, from the time of the Stone Age to the time of Persian mosaics executed in the sixteenth century.—After an interruption of three months, the work of transformation in the Butte Montmartre has again been taken up. The grotto and the artificial rocks are finished, and a bridge is being made over the little torrent, which rises at the head of the square. The gardeners have begun to design the alleys of the garden, which will be one of the curiosities of Paris.—A project is on hand to take the Seine water below Carrage d'Abion, and convey it by underground reservoirs to the Place d'Italie.—The great clock of Rouen has lately been restored, the dial-plates have been decorated with a polychrome ornamentation similar to what they had in 1529, with allegorical care and personages in gold and colours. This curious restoration of sixteenth-century work has been carefully done by M. Sauvageot. The strengthening of the arch and the rebuilding of a little house at the foot of the tower, known as the "Loggia," are now being carried on. The work was begun in 1890.—The work of turning the waters of the Avere and Vigne into Paris is now well advanced. The waters enter the Department of the Seine through a tunnel in the side of St. Cloud, and they empty themselves in front of a grille in the Bois de Boulogne. Here they are carried above the Seine by a bridge with an inclined floor, the piles of which are now finished. The foot-bridge for pedestrians, above this bridge, will probably be ready in about two months.

The Compagnie du Chemin de Fer are building a monumental station at Pantin, near the new Mairie. It consists of a central pavilion, 50 metres long, flanked by two aisles. This station will be opened in March.—In order to minimise the danger arising from the fires in cellars, and to facilitate the prompt discovery of the locality of the fire, the Préfet de Police has asked all householders to leave with their concierges an exact plan of their cellars and basements, which, in case of fire, can be given to the firemen.—M. Bourgeois,

Minister of Public Instruction, last Sunday presided at the inauguration of the statue of the composer Méulou, on the Place de la Ville at Givet (Ardennes).—On October 1 a new line of railway was opened in Corsica from Vizzanovo to Vivario.—The death of M. Georges Guerin, artist, painter, and sculptor, is announced. He was a pupil of M. Yon, and painted still life.

MISCELLANEOUS.

RUBBER STUDS FOR FLOORS, STAIRS, &c.—Messrs. David Moseley & Sons, of Manchester, send us specimens of their new rubber stud. This consists of a small iron plate with nail points projecting from the under surface, around which india-rubber is moulded and vulcanised, leaving the nails projecting through it. The result is a rubber stud about an inch square and $\frac{1}{2}$ inch thick, with bevelled edges, which can be fixed at once into wood by one sharp blow of a hammer, the nail points forming a sufficient fixing. It is proposed by the makers that these should be used for fixing into floors or stairs when it is desired to combine noiselessness with a firm foothold. For a large area we imagine the labour of setting and fixing so many would be more than the result is worth. For wooden stairs they may be useful, and they have the advantage that if studs in one place are more worn than the others, they can be taken out and replaced without disturbing the remainder. The makers advertise also smaller circular studs on the same principle, for fixing into boot-soles.

A NEW PORTABLE SCAFFOLD.—We have had an opportunity this week of seeing in action, in front of the shop of Mr. Shingleton, blind-maker, High-street, Kensington, a new portable scaffold, which consists essentially of a telescopic central leg or support, up or down which a small platform, with room for two men to stand, is moved by mechanical means. The vertical support of the scaffold is provided at its upper end with strong irons provided with small wheels for bearing against the wall of the building, so as to facilitate its movement along a frontage. It is secured by ropes round chimney-stacks or other objects, much in the same way as ladders are secured. The apparatus did not work very smoothly at the time of our visit, owing, it was said, to the warping of some of the woodwork, but there is something in the idea, and the scaffold may be found very suitable for painters and others needing a light and easily shifted temporary staging for work in front of houses. We understand that the invention is a foreign one, and that provisional protection has been obtained for it at the Patent Office.

KING'S COLLEGE, LONDON.—In the Division of Public Health arrangements have been made for systematic instruction in hygiene and on the various subjects embraced within the duties of sanitary officers. A course of lectures will be given by Professor Banister Fletcher, on Building Construction, a course by Dr. Allan on General Duties of Sanitary Inspectors, and a course by Professor W. R. Smith on "Physics and Chemistry in Relation to Sanitary Science."

ALDGRATE PUMP.—At last week's meeting of the City Commissioners of Sewers it was announced that an electric light is to be placed on Aldgate Pump: thus a time-honoured landmark enters upon a new stage in its career. The pump, now served, we believe, by the New River Company, marks the sites of the buried chapel or crypt, of St. Michael's, and a house occupied by Stow, who says—"The principal street of this ward [Aldgate] beginneth at Aldgate stretching west to sometime a fair well, where now a pump is placed." He tells us how the bailiff of Romford was brought by the sheriff's order to the well within Aldgate for execution of sentence, and was killed "upon the pavement of my door where I then kept house." Skyrpe recounts that he found Stow, in 1549, dwelling by the well where now a pump stands, between Leadenhall and Fenchurch streets. Stow seems to have been unaware that a few feet north-west of the pump lay the buried crypt of St. Michael's, of which, whilst commonly stated to have been re-discovered in 1759, Ducarel had a drawing dated 1774. Views of the interior will be found in the *Gentleman's Magazine*, April, 1789, and, with a plan, in Wilkinson's *Londina Illustrata*, vol. i. Extending 46 ft. north to south, by 17 ft. east to west, and having two aisles divided into three bays, vaulted with pointed arches, it is said to be the work of Norman, who in 1105 became prior of Queen Matilda's Christ Church, in the parishes of St. Mary Magdalen, St. Michael, and the Blessed Trinity, formed into one parish,—Holy Trinity by Aldgate, which priory, as rebuilt, Margaret, daughter and heir of Sir Thomas Auley, Lord Chancellor, brought in marriage to Thomas, fourth Duke of Norfolk. The ground within the crypt rose to 3 ft. or 4 ft. below the capitals of the columns, and the road outside, to perhaps 25 ft. above its original level. The walls are described as being made of squared blocks of chalk, the arches and groining of stone. The crypt was destroyed, we are informed, about twenty years ago.

* The gateway was illustrated in Mr. Birch's "Old London," at the Exhibition of 13

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered, No date.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv, vi, vii, viii. Public Appointments, p. xx, & xxi.

CLOCK, GREAT SALKELD, PENRITH.—At the parish church of Great Salkeld a new Cambridge quarter clock, showing the time upon one external skeleton dial, 4 ft. 6 in. diameter, with copper hands, and balanced within, has just been erected.

THE ENGLISH IRON TRADE.—The English iron market shows little change, although in several districts slight signs of general improvement are manifested.

ADDITION TO SCREEN, LITTLEIGH CHURCH, DEVONSHIRE.—An addition has been made to the screen of Littleigh Church as a thank-offering from a parishioner.

double. The north-west gate was a single gate, the total opening, 10 ft., being about only half that of the other three gates. The north-east gate was a double gate, and was a fac simile of the south-western gate.

LAND AT WILLESDEN.—A portion of the Willesden Park Estate was, we are informed, sold by Messrs. Baker & Sons on Wednesday, sixty plots of building land realising 3,200l., at the rate of 1,550l. per acre.

LECTURES ON HYGIENE.—Mr. Edward Tidman has been appointed Lecturer on Hygiene, and commences a course of lectures on October 13, at Cheshunt, Herts, for the Cheshunt Technical Education Committee.

MEETINGS.

- MONDAY, OCTOBER 10. Clerks of Works' Association (Carpenters' Hall).—Monthly Meeting, 8 p.m. TUESDAY, OCTOBER 11. Sanitary Institute (Lectures for Sanitary Officers).—Dr. Louis Parkes on "Water Supply, Drinking Water, Pollution of Water," 8 p.m. FRIDAY, OCTOBER 14. Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. C. Tyndale on "House Drainage," 8 p.m.

RECENT PATENTS:

- 16,445.—COWLS: W. F. Young.—This patent refers to an improved ventilating coil intended for draught or upcast draught in pipes, flues, &c. Above a circular having openings towards the top of the pipe, each cone is mounted one upon the other by means of projecting hearers, the uppermost cone being provided with a cross-bore perforated in the centre, below which is a tube receiving a rod of an oval revolving cow-head bent downwards to form a series of bafflers to catch the wind, by the agency of which the head of the cow revolves. The bottom of each baffle is the head of the cow to an iron rim, which tends to strengthen the whole of the cow-head. The spindle upon which the cow-head revolves passes through the top of the sheet-metal portion,

and is secured thereon by a screw-nut. The bottom of the spindle is of a conical shape, and bears upon the bottom of the tube before mentioned.

17,363.—WATER CLOSERS: J. Day.—This patent refers to what is termed an improved water-closer in the construction of a water-closer in which the external matter is received into water contained in a bowl supplied by the waste water from the sink, bath, or other source, and the contents of which are continually discharged into a container, from which they pass into a trap into the drain. This container contains a tilting-bowl, shaped to fit the trap, and has pivoted within it a tilting-bowl, shaped to fit the trap, and is only partially filled with water, it is heavier on one side, balancing up the opposite side against a suitable stop; but when the bowl is full the opposite side is heavier, and tilts the bowl over to discharge the contents into the container, and from thence through the trap. Immediately the contents have been discharged the bowl balances itself up again into its normal position for receiving a fresh charge.

17,381.—BRICKS: G. H. Shoppee.—The object of this invention is to provide a brick to supersede ordinary bricks for vaulting and arching, where either a circular or flat soil is required, so as to avoid weight and the thrust which arises when ordinary bricks are used. The brick is made of the form of an ordinary brick which has been cut away at the back along a two-thirds to one-third leave a dove-tail projection standing out from the front face portion of the brick, which remains unaltered. This dove-tail projection is used in such a manner as to leave the end of the brick to the other, or one of the ends may be left solid and not cut away, so that the bricks may be used for courting or ranging with other brickwork. The unglazed, or the front face and end, may be glazed or may have perforations formed crosswise through it, so as to admit an opportunity of inserting cramps or bonders, when the dove-tail has been used in such a manner as to form a segmental arch or flat soil. The bricks are spaced between the dovetail by a concrete backing, the spaces between the dovetail being filled in with fine cement and gravel or with ordinary cement concrete.

17,391.—WINDOW SASHES: F. Schmalz.—This invention has for its object to substitute the window sashes incidental to opening and closing windows situated at a considerable height above the floor level, and to enable the window to be opened either at the top or bottom as cold air be admitted. For details of the invention we must refer our readers to the specification and drawings.

12,174.—ARTIFICIAL STONE: O. Terp.—This invention relates to an artificial stone having the same qualities, such as durability, resistance to atmospheric and other outward influences, and presenting the same appearance as natural stones, but with greater hardness. The inventor produces a chloride solution, consisting of a chloride of calcium, chloride of magnesium chlorated water, hydrochloric acid, as described in the specification. This solution is intimately mixed with what is known in Germany as litter earth, with pig-fibre, paper pulp, or other materials, to make up bulk, according to the material to be manufactured. The hardness of the stone or composition can be made more or less by the addition of hydrochloric acid. This composition can be used as artificial sandstone, veined or other marbles, mosaics, moulds or plates of Paris, cement castings, pavement flags, stair-steps, &c.

12,175.—PAINTS: O. Terp.—This refers to an application of the chloride solution named in the foregoing specification for coating surfaces, and giving them an enamel character.

12,539.—VENTILATION: H. A. Peole.—This specification relates to improvements in the method and apparatus for ventilating public buildings, dwellings, greenhouses, stables, &c., and the like, and the object is to provide a simple and effective method and apparatus whereby the windows can be automatically and gradually opened or closed in accordance with the rise and fall of the temperature of the atmosphere, and thereby fresh or cool air headmitted or excluded. The improvements consist in utilising the atmosphere for the expansion of a volume of a fluid, and causing such air or gas, in connexion with suitable mediums, to

LONDON—For the erection of a cottage, lodge, &c., at "Irish Corner," East Finchley, for the Islington Rural Board. Mr. F. H. Barfield, architect, Strand & Grosvenor, N. ... 4339 0
 Marchant & Hirst 4338 0 Wheeler & Co. 4339 0
 Stevens Bros. 387 0 Hy. Cooper 387 0
 Chas. Fowman 385 0 E. Houghton & Son, Ltd. ... 385 0
 McFarlane Bros. 382 0 *cutting read (accepted)* .. 289 0

LONDON—For alterations and additions to "Fern Bank," Florence-road, Strand Green, for Mr. G. W. Woodrow. Mr. F. H. Barfield, architect, 88, Lancaster-road, Strand Green, N. ... 4107 0
 Paton Playfair 4108 0 Marchant & Hirst 4108 0
 E. Houghton & Son. ... 97 10 Stevens Bros. (accepted) .. 75 0

PLYMOUTH—For alterations at the Conservative Club, Mr. Jas. H. Kent, architect, 7, Funchel. Quoted by the architect:—
 R. Stanlake £277 17 3 H. Blackall £107 10
 Laphorn & Good 181 5 W. Trevena, Plymouth 139 0
 A. W. Lethbridge 175 0

PLYMOUTH—Accepted for alterations at the "Golden Lion" Hotel, for Mr. Jas. F. Bennett. Mr. Jas. H. Kent, architect, Plymouth. Quantities by the architect:—
 T. May, Plymouth 2384 0 0

PLYMPTON (Devon)—For roofing and other work at the Workhouse, for the Union Guardians. Mr. Jas. H. Kent, architect, Bedford-street, Plymouth. Quantities by the architect:—
 A. B. Lethbridge & Son £172 9 10 W. Ruffell £119 10
 Laphorn & Good 147 10 Coble & Truscott 113 8
 W. Blake 142 5 E. Cooper 110 0
 A. N. Cole 129 0 W. Jenkins, Park street, Plymouth (accepted) .. 107 9
 Carter & Fisher 131 10
 A. Andrews 120 0

SALE—For the execution of certain road works and lighting, Richmond, for the Local Board. Mr. A. G. McNeill, architect, Plymouth. Sale:—
 Matthew Taylor & Son £222 4 8
 William Barton, Hale £170 0 0
 George Johnson 209 0 0

SHEPHERD—For the construction of new sewers in Peightmore-street, Shepperton, Valence-road, Kenilworth-street, Andrew-street, and Wickham-lane, Shepperton, from plans, specifications, &c., prepared by Mr. C. F. W. Keble, C.E., Borough Surveyor:—
 James Dickson £2,874 12 6
 G. W. Naylor, Huddersfield & Walsden 7,102 3 6
 Derden & Williams 800 2,138 6 6
 (through Surveyor's estimate, £2,124 2s. 3d.)

WEST HAM—For constructing the Forty Acre-lane sewer, for the Corporation of West Ham. Mr. Lewis Angell, Borough Engineer:—
 Cooke & Co. £1,627 8 0
 J. Newby 824 0 0
 W. Griffith 848 0 0
 J. Ruffell, East Ham 794 6 0
 Accepted.

WEST HAM—For fencing recreation-ground, South West Ham, for the Corporation of West Ham. Mr. Lewis Angell, Borough Engineer:—
 Merritt & Franklin £1,263 5 0
 A. E. Wain 867 0 0
 J. G. Horlock 879 6 0
 D. Barlow 872 19 8
 Pyle & Pugh 810 12 0
 E. G. White 801 0 0
 The Turner, Ltd. 792 0 0
 7. Salisbury 4795 6 0
 London & Sons 712 5 0
 M. Marshall 722 5 0
 M. Ford 7 8 0
 A. G. W. Brown 877 6 0
 J. Jackson 670 0 0
 Howland Bros., Blithfield, Wey (accepted) 568 3 9

The Builder Cathedral Series.

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6. BATH ..	June 6.	12. Gloucester ..	Dec. 5.
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Post-free FOURPENNY HALF-PENNY each, except Nos. 1, 2, 3, and 4, which are sent by post, but the stamp, plan, and description of CANTERBURY, LICHFIELD, ST. ALBAN'S, and Peterborough have been re-printed, and they can now be had, price EIGHTPENCE each set; by post, 10s.

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The Builder.

Vol. LXIII. No. 2263.

OCTOBER 15, 1892.

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New Church, Miles Platting, Manchester: Interior.—Mr. Leonard Stokes, Architect	Double-Page Ink-Photo.
The New Travellers' Club, Piccadilly.—Messrs. T. & F. T. Verity, Architects	Double-Page Ink-Photo.
Workmen's Dwellings, "Cathedral Court," Glasgow.—Messrs. Burnet, Son, & Campbell, Architects	Two Single-Pages Photo-Litho's.

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Art and Architecture in Tennyson's Poetry.



It is always of interest to notice, in the works of a great poet, what are the things in art which have specially impressed him as worthy of characterisation in poetry, or as furnishing material for poetic illustration or metaphor; and the present seems a fitting occasion for turning over and summarising the late Poet Laureate's contributions to the poetic literature of art. And the interest of such artistic allusions or illustrations in poetry is a double one. We are concerned to note not only how the poet has regarded such a work or such a form of art, and what impression it has made on his intellect, but how he has expressed that impression, whether he has added anything to the vividness of our perception of an artistic fact, placed it in a new light, led us to see a new beauty in it. In this sense, poetic description of an effect of art becomes in itself a form of artistic delineation.

At the time of Browning's death, we offered some remarks on the numerous and striking passages bearing on architecture, sculpture and painting to be found in his poetry. In the poetry of Tennyson there is nothing like the same bulk of what may be termed "quotable" passages in reference to art, and the difference in the nature of the artistic references in the works of the two poets is remarkable. Browning possessed the special insight and knowledge of an critic, and with it the tendency to analysis which is the natural bent of a critic. Occasionally he just glances at a bit of artistic effect in passing, throwing as it were a momentary flash of light on it; but very often his passages about art, the longer ones especially, are essentially art criticism, and criticism or analysis is obviously more predominant in his mind than poetic expression. This is never the case with Tennyson. The only poem of his in which there is anything like an analysis in regard to art, "The Palace of Art," is an analysis only on the moral side, a consideration of the morality of a devotion to *L'Art pour l'art*, to the

exclusion of all considerations of good and evil, of human suffering or human progress. The actual descriptions of works of art, of the palace and its pictures and decorations, are descriptions merely,—word-pictures, often of singular beauty and concentration of expression, to some of which we will return; but they suggest no analytical or critical considerations whatever. They are simply the decoration of the poem; a decoration carried out to such length and elaboration that the moral thought, which is the essential object of the poem, is in danger of being overlooked and forgotten. And throughout Tennyson's poetry we find, as in this case, that his descriptions of art are purely poetic in their object. He never appears to put the reasoning on the subject before the consideration of poetic effect, as Browning often did. His descriptions of works of art are brought in purely as the decoration of his poetry, as similes or pictures which give an added beauty and interest to the poem; and (with the solitary exception of the "Palace of Art," where, as already observed, the decorative element of the poem rather ran away with him) they are always admirably introduced; not forced in, but woven in as bits of decorative description naturally suggested by the subject. In some cases they take the form of descriptions of things seen; in others, perhaps the majority, they are reminiscences of existing forms of art without reference to any special example; in a few instances they are original suggestions on which an actual design might be based. But in all cases they are marked by an exquisite felicity of diction, a power of giving the essential beauty and character of an artistic object in a few concentrated words, a selection of epithets which is probably the result of thought, but which impresses the reader as a spontaneous instinct in the choice of the words best fitted to convey the essential quality of the picture, a refinement of expression which is in itself a form of art of the highest order.

As far as architecture is concerned, it is evident that Tennyson's sympathies were with the picturesque of Gothic rather than with the purity of line and calm expression of Classic architecture. In his magical verse "To E. L., on his Travels in Greece," a poem purely Greek in its feeling for landscape, we find not a hint about that which now makes

to most educated men the special interest of Greece, the architectural remains of her temples. Greek sculpture no doubt suggested

"The broad limbed Gods at random thrown
By fountain urns:"

but otherwise it is the bright Greek landscape and Greek sky which attracts him, the land

"Where many a slope was rich in bloom
From him that on the mountain lea
By dancing rivulets fed his flocks,
To him who sat upon the rocks,
And fluted to the morning sea."

Which latter line is full of the blitheness and freshness of antique Greece. But of the temples, those most precious and instructive relics of the Greek artistic spirit, not a word. Perhaps "E. L." gave no hint for it. In "The Palace of Art" the description of the building is entirely in the Gothic spirit,—the spirit of multitudinous detail, and rich colouring, and long vistas, and lofty arcades.

"A huge crag-platform, smooth as burnished brass
I chose. The ranged ramparts bright
From level meadow-bases of deep grass
Suddenly scaled the light."

How the "level meadow-bases" remind us of the ground which forms the base line to some of our cathedrals; Salisbury, for instance, rising vertically from its level lawns. But "smooth as burnished brass" is rather in false taste, something of the *cliquant* about it. The interior of the Palace is finer:—

"Four courts I made, East, West, and South and North,
In each a squared lawn, wherefrom
The golden gorge of dragons spouted forth
A flood of fountain-foam.
And round the cool green courts there ran a row
Of cloisters, branched like mighty woods,
Echoing all night to that sonorous flow
Of spotted fountain floods."

Here we have a glorified edition of the Mediaeval cloister.

"And round the roofs a gilded gallery,
That lent broad wings to distant lands,
Far as the wild swan wings, to where the sky
Dipt down to sea and sands.

* * * * *
And high on every peak a statue seemed
To hang on tiptoe, tossing up
A cloud of incense of all odour, steamed
From out a golden cup."

This incident of the statues on every peak

was perhaps partly a reminiscence of Milan, of which there is a touch in another poem to be mentioned presently, and around this multitude of statues—

"The light aerial gallery, golden-railed,
Burnt like a fringo of fire."

And here we enter the Palace again—

"Likewise the deepset windows, stained and traced,
Would seem slow-flaming crimson fires,
From shadowed grots of arches interlaced,
And tipt with frost-like spires."

It seems hard to place this last detail. The windows are evidently seen from within, but the "frost-like spires," surely those should be exterior details; we can hardly see where they come in, unless the idea is of arches honeycombed with niches each with its crocketed finial.

"Full of long-sounding corridors it was
That over-vaulted grateful gloom,
Thro' which the livelong day my soul did pass,
Well pleased, from room to room."

"Full of great rooms and small the palace stood,
All various, each a perfect whole
From living Nature, fit for every mood
And change of my still soul."

The rooms were filled with wall-paintings, of which a wondrous catalogue follows; but we are concerned just now with the architecture. The palace, besides these varied rooms, was not without its great hall, where architecture could have her fullest and grandest expression:

"Above, the fair hall-ceiling stately-set
Many an arch high up did lift,
And angels rising and descending met
With interchange of gift."

This last is a really original idea in sculptural decoration, which might be laid hold of and worked out in a great building, if ever there were a chance for it in these days of economy and Office of Works rule. Equally the pavement was a field for a grand decoration, full of meaning:—

"Below was all mosaic choicely planned
With cycles of the human tale
Of this wile world, the times of every land
So wrought, they will not fail."

But over these she trod, and those great bells
Began to chime. She took her throne:
She sat betwixt the shining orials
To sing her songs alone.

And thro' the topmost oriels coloured flame
Two god-like faces glazed below,
Plato the wise, and large-browed Verulam,
The first of those who know.

And all those names, that in their motion wore
Full-walling fountain-heads of change,
Betwixt the slender shafts were blazoned fair,
In diverse raiment strange:

Thro' which the lights, rose, amber, emerald, blue,
Flush'd in her temples and her eyes,
And from her lips, as morn from Memnon, drew
Rivers of melodies."

This suggestion of music from the colouring of the stained windows reminds one of Viollet-le-Duc's remarkable reminiscence of his childhood, when, being carried into Notre Dame on the occasion of a high function, he thought that the sounds of the organ came from the colouring of the great rose window, which he gazed upon with awe. But if the place was richly lighted by day, colour was not to be forgotten, either, when the sunlight had died out of the stained windows; the soul would still have her coloured light.

"She,—when young night divine
Crowned dying day with stars,
Making sweet close of his delicious toils,—
Lit light in wreaths and anodons,
And pure quintessences of precious oils
In hollowed moons of gems

To mimic heaven; and clapt her hands and cried,
'I marvel if my still delight
In this great house, so royal-rich and wide,
Be flattered to the height.'"

This idea also, of the mimic heaven of lights, might be actually carried out in the lighting of a great dome. The poem is or should be familiar to every English reader; but it came among the earlier poems, less read and less

familiar now than many of the later ones, and it is worth while to draw attention again to this magnificent example of architectural conception in poetry, which probably, for grandeur of effect combined with richness and multiplicity of detail, can hardly be matched elsewhere in poetic literature.

This strong sympathy with Gothic richness and multiplicity comes out again in the description of Camelot and the hall built by Merlin for Arthur in the Idylls ("The Holy Grail"):

"For all the sacred mount of Camelot,
And all the dim rich city, roof by roof,
Tower after tower, spire beyond spire,
By grove, and garden lawn, and rushing brook,
Climbs to the mighty hall that Merlin built,
And four great zones of sculpture, set betwixt
With many a mystic symbol, gird the hall:
And in the lowest beasts are slaying men,
And in the second men are slaying beasts,
And on the third are warriors, perfect men,
And on the fourth are men with growing wings,
And over all one statue in the mould
Of Arthur, made by Merlin, with a crown,
And peak'd wings pointed to the morning star."

In a passage in the same poem we have a sketch of the rich crumbling city of ancient Camelot, as seen from within, which is like an etching by Méryon, one of his strange, weird, exaggerated dreams of ancient Paris:—

"Our Camelot,
Buil by old kings, age after age, so old
The King himself had fears that it would fall,
So strange, and rich, and dim; for when the roofs
Tatter'd toward each other in the sky,
Met forehead all along the street, of those
That watched us pass."

To turn from these rich fancies of imaginary architecture to sketches of existing effects, we find a remarkable collection of slight but effective touches in the poem called "The Daisy," which is really a reminiscence of a rapid journey across Italy, taking its name from the incident of a daisy plucked on the Splügen. These succeeding descriptions are of the shortest, just light touches in passing, but notice how the poet in a few happily chosen words has in each case touched the essential feature and sentiment of the various architectural incidents, —

"What Roman strength Turbia showed
In ruin, by the mountain road;
How, like a gem beneath, the city
Of little Monaco, basking, glowed."

Let the reader notice the contrast between the slow sturdly syllables of the first line, and the tripping measure in which "little Monaco" is introduced:

"What slender campanilli grew
By bays, the peacock's neck in hue."

Nor knew we well what pleased us most,
Not the clipt palm of which they boast;
But distant colour, happy hamlet,
A mouldered citadel on the coast,

Or tower, or high bill-convent, seen
A light amid its olives green."

What a true touch of Italian landscape is that last line. Then comes the sketch of Florence—

"In bright vignettes, and each complete
Of tower or duomo, sunny-sweet,
Or palace, how the city glittered
Thro' cypress avenues, at our feet."

Then the weather changes as well as the scene—

"And stern and sad (so few the smiles
Of sunlight) looked the Lombard piles;
Porch-pillars on the lion resting,
And somb're, old, colonnaded aisles."

O Milan, O the chanting quires,
The giant windows' blazoned fires,
The height, the space the gloom, the glory!
A mount of marble, a hundred spires!"

The last verse has been quoted so often as to have become almost proverbial, but it is not equal in the delicacy of its touch to those on Turbia and on the white buildings among the olives; besides the question whether, from an architectural point of view, Milan was quite worth the outburst.

The "Recollections of the Arabian Nights" shows Tennyson's sympathy with Oriental

richness and warmth of colouring, though this is mostly bestowed on the gardens, when

"Adown the gardens I was borne,
By Bagdat's shrines of fretted gold,
High-walled gardens green and old";

still he comes to the great pavilion, where there is a sketch of the entrance:

"Right to the carved cedarn doors,
Flung inward over spangled floors,
Broad-based flights of marble stairs
Ran up with golden balustrade";

but for the most part the poem is concerned rather with the gardens than the architecture. As a contrast with this we may take the sketch of the Christian shrine in "Sir Galahad"—

"When down the stormy crescent goes,
A light before me swims,
Between dark stems the forest glows,
I hear a noise of hymns;
Then by some secret shrine I ride;
I bear a voice, but none are there;
The stalls are void, the doors are wide,
The tapers gleaming fair,
Fair gleams the sunny altar-cloth,
The silver vessels sparkle clean;
The shrill bell rings, the censer swings,
And solemn chants resound between."

In "Maud" again, we meet with two finely contrasted touches—the cottage homes, seen—

"When the sunset burned
On the blossom'd gable-ends
At the head of the village street,"

and the brand-new mansion of the millionaire—

"New as his title, built last year,
There amid perky larches and pine,
And over the saulen-purple moor
(Look at it) pricking a cockney ear."

We can see the house, modern Elizabethan ("Queen Anne" had not begun to reign when "Maud" was written), brick with stone dressings, of course, with the inevitable turret. Among other picturesque touches connected with architecture or decorative work may be noted the sketch of the half-ruined castle court into which Geraint rode—

"His charger trampling many a prickly star
Of sprouted thistle on the broken stones"—

A touch which reminds one of Albert Dürer:

"He looked and saw that all was ruinous.
Here stood a shattered archway plumed with
Tern;

And here had fallen a great part of a tower,
Whole, like a crag that tumbles from the cliff,
And like a crag was gay with wilding flowers:
And high above a piece of turret stair
Worn by the feet that now were silent, wound
Bare to the sun."

Another fine effect is to be noted in "The Princess"—

"Then we past an arch,
Whereon a woman-stature rose with wings,
From four winged horses dark against the stars;"

and further on in the same poem an idea for a wrought-iron gate, which represented the legend of Acteon, and formed the garden entrance, flanked by sculpture—

"Two great statues, Art
And Science, Caryatide, lifted up
A weight of emblem, and betwixt were valves
Of open work in which the hunter rood
His rash intrusion, man-like, but his brows
Had sprouted, and the branches thereupon
Spread out at top, and grimly spiked the gates."

There is an original idea for wrought-iron design, this time Renaissance rather than Gothic in feeling, and well worth working out in actual design. Another fine bit of decorative work is figured in the description of Arthur's throne at the jousts, in "Lancelot and Elaine"—

"And from the carven work behind him crept
Two dragons gilded, sloping down to make
Arms for his chair, while all the rest of them
Thro' knots and loops and folds innumerable
Fled ever through the woodwork, till they found
The new design in which they lost themselves,
Yet all with ease, so tender was the work:
And in the costly canopy o'er him sat
Blazoned the last diamond of the nameless king."

This dragon chair again is Gothic, or more strictly, Scandinavian in taste. The diamond,

the prize of the tourney, gives occasion for a new point when it is to be delivered up to the winner. The diamond was placed, it seems, in the centre of a flower forming one of the ornaments of the chair-back:—

So saying, from the carven flower above,
To which it made a restless heart, he took,
And gave, the diamond.

We seem to see the flash of that "restless" diamond, poised in the carven flower, for long after.

We have said nothing yet as to the poet's references to the art of painting, of which here are few and of the slightest kind, save in that wonderful gallery of pictures, before referred to, in the Palace of Art. As concentrated descriptions of different types of painting even Browning, the poet of art *par excellence*, can hardly show anything equal to his; Browning's sympathies (in poetry) were in the whole more for sculpture than painting, and his best artistic descriptions deal with that or with architecture. In this gallery of Tenyson's each picture is painted in one stanza, so completely and with such rare perception of the meaning and effect of words, that we seem to see each painting in succession as verse after verse unfolds them:—

One seemed all dark and red, a tract of sand,
And some one pacing there alone,
Who paced for ever in a glimmering land
Lit with a low large moon.

And one, a full-fed river winding slow
By herds upon an endless plain,
The rugged rick of thunder brooding low
With shadow streaks of rain."

Then we pass from landscape, after a few more stanzas, to an early pre-Raphaelite picture, portrayed with equal insight and clearness of expression—

Or the maid-mother by a crucifix
In tracts of pasture sunny-warm,
Beneath branch-work of costly sardonyx
Sat smiling, babe on arm."

The next is the Renaissance picture—


Or in a clear-wall'd city on the sea
Near gilded organ-pipes, her hair
Wound with white roses, slept St. Cecily;
An angel looked at her."

Notice the admirable effect of the epithet "clear-walled," one of those inspirations of poetic diction which cannot be reduced to absolute meaning, and yet which completely gives what it is intended to convey, the idea of a bright fresco-like painting, in which everything is in full daylight. But every one of this gallery of pictures is a study not only in regard to the pictorial idea conveyed, but in the perfect and finished use of language in conveying the idea completely in so few words.

We may close with a word as to the moral of this same poem, a moral which, as already remarked, is rather over-weighted by the decorative portion of the poem, but which is of interest as an evidently serious expression of conviction on the part of the poet as to the relation of art to life. Art, according to this moral, is not to be an object of worship apart from or above humanity, not the one absorbing aim in life; and that Tenyson had not changed his feeling on this point in later years is evident from the pathetic poem in his last published volume, "Romney's Remorse," founded on an incident in the life of the painter, who is said to have deserted his young wife that he might the better give up his mind to painting, and thus "lost salvation for a sketch." To Tenyson's grave and reverent nature it evidently appeared that it was a better thing to be a chivalrous and a devout man than to be a great artist; not that the two aims were incompatible, but that the former should take precedence of the latter; a moral which is perhaps not quite superfluous in the present day.

PROPOSED MARINE DRIVE, DOUGLAS HEAD.—Messrs. Maxwell & Tuke, of Manchester, have been selected out of a number of applicants as the engineers to the Douglas Head Marine Drive, Limited.

STEEL AND IRON FRAME CONSTRUCTION IN THE UNITED STATES.

 SYSTEM of construction that is rapidly gaining in favour in the United States in the erection of large office buildings and other high structures, especially where land is valuable, is that known as steel or iron frame construction. This system was developed in Chicago a few years ago. Chicago soil, as a rule, has a very poor bottom, and in the erection of high buildings such heavy walls and foundations were required as to seriously interfere with light and space,—to say nothing of expense. Under these circumstances, some system of construction was looked for that should reduce the thickness of the walls to a minimum, while giving ample strength for a heavy building. The steel frame system was the result. After having been used in Chicago, the system was found to possess so many advantages that it has been used in several important buildings in other cities, and it seems not unlikely that it may be developed to the exclusion of every other, in the erection of high buildings where light and space are of importance.

We may take as a recent example of this system of construction the block called the Betz building in Philadelphia, now in course of completion. It stands in the heart of the city, adjoining the Mint, and immediately facing the "Public Buildings," on a site which is claimed to be the finest in the city of Philadelphia.

Steel frame construction may be briefly described as consisting of a framework of steel girders, columns, and joists, connected together much in the same way as they would be in a bridge (but without struts or ties), the floors, roof, and partitions being formed of hollow brick or terra-cotta. The outside walls are built entirely independent of the ironwork, and hence are much lighter in construction than they would otherwise require to be. In some cases the walls of the upper stories are carried by the steel framework, independently of the walls below, though for what possible object, except to endanger the stability of the building, an English architect would find it difficult to understand. This, however, is not the case in the Betz building, where the steel frame carries all the weight of the floors, and the walls are practically separate altogether, though connected laterally by means of iron straps.

A strike of stonecutters that occurred recently delayed the masons on all jobs in the eastern States, and in the case of the Betz building no stone could be obtained for several weeks. This did not prevent the ironwork being proceeded with, and on July 1 the building presented the extraordinary appearance of a lofty labyrinth of thin steel framing soaring up into the sky, far above any of the adjoining buildings, the lower portion of it only being encased with three stories of masonry architecture of the usual type: and it was somewhat difficult to realise that this masonry was what might be called the non-essential part of the structure, and that the metal scaffolding (as it appeared) was the permanent central construction.

The advantages claimed for this system of construction, in addition to those already mentioned, are saving of time, increased substantiality, and fireproof qualities. The first of these advantages is (to the American mind) one of great importance in buildings of this class, because, as a rule, they are erected in situations where rental value is very high; and the saving of a foot or two of space is, for the same reason, an important gain. Such a saving may mean a material increase in income from office rent, and this, to all intents and purposes, means a reduction of cost in the building when interest on capital is taken into consideration.

The strength of a building of this class, as compared with one of ordinary construction, can only be determined by elaborate figures; but it is not difficult to understand that first-class steel, properly put together, will provide

a structure very much stronger, as long as it lasts, than one of stone or brick, especially when we take into consideration the wind pressure on a high building, and the resistance to transverse strains in a building the whole interior structure of which is rivetted and braced together; and while this system of construction is not absolutely fireproof, it approaches very closely to that condition. Brick and terra cotta exclusively probably possess better fireproof qualities, but they are considered impracticable for use in an office building by reason of the increased thickness of walls required, and the consequent smaller openings. A steel frame building can only be destroyed by large quantities of burning material inside the building, which might possibly cause the girders to bend. As, however, the whole of the ironwork is protected by a covering of hollow bricks, this danger is reduced to a minimum. Almost invariably the fire would be confined to the floor in which it broke out, as the only material upon which it would have to feed would be the goods stored therein and the wooden floor coverings and windows.

The Betz building is thirteen stories high, exclusive of the basement and cellar. It has a frontage of 104 ft. 2 in. to Broad-street, and a frontage of 100 ft. 2 in. to South Penn-square. The height from the pavement to the top of the cornice is 194 ft., and the height from the bottom of the foundations to the top of the cornice is 220 ft. The walls of the lower stories are erected in granite; the remainder in limestone. The main columns are octagonal in section, and are supported by blocks of stone 3 ft. 4 in. square and 2 ft. deep; the stones rest on beds of concrete. The main girders carrying the floor-beams are 20-in. steel beams, 80 lbs. to the foot, and rest on steel base-plates on the centre of the columns. All of the girders are tied together at the joints by steel plates ½-in. thick, and measuring 24 in. by 16 in., one on each side, secured with bolts; twelve ½-in. bolts to each joint. At the sixth floor level the steel girders in the east and south party walls are of two 15-in. steel channels, 32 lbs. per foot, with ¾-in. by 9-in. steel plates top and bottom set into the 20-in. steel beam girders, secured with angle-plates and bolts. At the seventh floor level the wall-girders are made of two 15-in. steel channels, 51 lbs. per foot, with ¾-in. by 9-in. steel plates top and bottom set into and secured to the 20-in. steel beam girders, as on the floor below. The eighth and upper floor girders are of the same construction, but with steel channels 32½ lbs. per foot.

The partitions are formed of 6-in. steel channels, 7 lbs. to the foot, put together with angle-plates, and secured to the beams at top and bottom.

The roof and all the floors, excepting the basement, are formed of hollow bricks, in the same manner as in Doulton's fireproof flooring, leaving a perfectly level ceiling. The bricks used in this case are 8 in. by 12 in. by 12 in., and are jointed with a mixture of Portland and Rosendale cements. The bricks are provided with dovetail grooves on all sides, with a lip at the bottom, which covers the flange of the girder and protects it from fire. The small steel beams that carry the arches are 5 ft. from centre to centre. Upon the arches is a bed of concrete 3 in. deep, and in this are bedded the small wooden joists to which the floor-boards are nailed. In the corridors, passages, and halls, tile floors will be used. The brick arch floors are guaranteed by the contractors to bear safely a weight of 2,200 lbs. per square foot.

The partitions are all built of 6-in. hollow bricks, of square section, laid in cement mortar and held in position at each end by the steel channel irons before-mentioned. Around each column is a fireproof covering of brick that is of material advantage in preventing damage to the structure by incipient fires. Wherever necessary, porous terra-cotta is used for nailing the woodwork. This is made by mixing sawdust with clay.

It may be of interest to state here that

these brick floors cost about 25 cents (1s.) per square foot, and the partitions 18 cents (9d.) per square foot, both prices being exclusive of the ironwork.

The Betz building will contain three hundred and four offices of large size and arranged so as to give the largest possible amount of light and air to each apartment. All the offices are to be finished with oak floors. Three hydraulic lifts are to be provided and a system of electric lighting supplied. The estimated cost of the building when completed is 1,500,000 dols. (300,000*l.*), not far from 1,000*l.* per office, which, if we are correctly informed as to the figures, seems an enormous cost, but we are unable to say what is the floor area or the number of apartments to be comprised in each "office."

And as to the "architecture" which surrounds this mass of steel-framed business burrows? Well, the architect (Mr. W. H. Decker, of Philadelphia), defines it as "modern Romanesque, elaborately ornamented." So far as the "architecture" had progressed it when we saw it, this description seems really to mean a variety of Richardsonesque, with the inevitable three colonnettes in a row, and blocks prepared for carved capitals on the Byzantine-like outline with flat carving which Richardson brought into vogue. From the make of the floor framings it was evident that above the second floor the building was to be carried up for a considerable height in that kind of system of a series of lofty bay-windows, repeated through several stories, which is rather a favourite with the architects of these tower-like American office blocks. Probably, on the whole, the architectural treatment will be fairly representative of the best class of American city buildings of this type. The question raised in the English mind is as to the *rationale* of the whole system. This deliberate building up of masonry architecture, for mere conformity with precedent, around a structure which is independent of it, seems an extraordinary example of the force of heredity in architecture. Why build up all this granite and carved stone screen around the real structure, merely as a concession to ancient superstition? This certainly is not architecture in any true sense. It would surely be more reasonable to treat the work as a steel structure with terra-cotta filling, where filling was required, and show the steel piers, and endeavour to find an appropriate artistic treatment of such a structure, instead of building an inappropriate one round it. As the thing stands, it represents one of the most audacious and costly descriptions of sham which the history of architecture has to present.

NOTES.

THE British School at Athens has just issued its Annual Report, and with it a special appeal for funds to continue the excavations at Megalopolis. The full bearings of the discoveries so far made are to be set forth in a report shortly to be issued by the Hellenic Society, but meantime we may draw attention to the fact that 300*l.* are wanted to complete the work, and more especially to clear out the Thersilion,—a building unique in character and interest. The Thersilion, it will be remembered, was seen and briefly noted by Pausanias (VIII., 32, 1), most fortunately for us, as but for his statement that it was a council-house, and that it took its name from the man who set it up, we might have been hard put to what to call it. It was "an enormous rectangular hall, whose floor sloped from the centre to the sides, and whose roof was supported by row after row of columns in a very peculiar disposition, radiating from the centre as well as parallel to the sides." Part of the difficulty and complication of the excavations at Megalopolis has resulted, according to the Director (Mr. Ernest Gardner), from the intimate relations between the theatre and the Thersilion, and the peculiar manner in

which the great portico between the two served as an integral part of both buildings. It is earnestly to be hoped that the necessary funds will be forthcoming. Subscriptions are received by the hon. treasurer, Mr. Walter Leaf, Old Change.

THE New School of Applied Art in Edinburgh is to be opened on the 21st inst. in the rooms in the Royal Institution recently vacated by the Society of Antiquaries. There are two rooms lighted from the roof, the larger of which affords ample floor space for a practical school of the kind contemplated, whilst the smaller room is suitable for the delivery of lectures in furtherance of the practical teaching of the school. The school is started with a fund of 2,500*l.*, 1,000*l.* of which was voted by the Town Council, the remainder being raised by public subscription, and will be under the supervision of a Joint Committee of the Board of Manufactures and the subscribers, along with two members of the Town Council. According to the prospectus, the school is established for the purpose of "imparting to architects, decorators, sculptors, wood-carvers, metal-workers, plasterers, book-binders, printers, glass-painters, &c., a knowledge of art design as applied to art industries." The instruction will begin practically where that of the Board of Manufactures' School leaves off, and will embrace the leading features of art styles from the Classic period until now. Dr. Rowand Anderson and Mr. A. Inglis, Secretary to the Board of Manufactures, recently visited London and Paris, and have secured casts of high-class works which will be valuable material for teaching purposes. Amongst these are examples of Greek decorative art supplied by the authorities of the British Museum, and a magnificent collection of photographs illustrating the progress of art from the twelfth to the seventeenth century. There is also a good collection of casts of English and Scottish work which will in course of time be augmented. The library of the Architectural Association has been removed to the Royal Institution, and will be at the service of the students for consultation. At the close of the session, bursaries of 5*l.* and upwards will be awarded to meritorious students, and there will be travelling scholarships of from 50*l.* to 100*l.* in value to such students as at the end of the completed curriculum may be considered worthy of such reward. The want of a school of this nature in Edinburgh has been long felt by those who desire first-class art work. Amongst others, Dr. Rowand Anderson has taken a prominent part in advocating the scheme, which it is hoped will in course of time enable him and others to procure at home what they have felt impelled to send for from elsewhere. Dr. Anderson is to act as Director of the Classes, and has, for assistants, secured the services of Mr. Frank Simon, Mr. John Wilson, and Mr. Robert Innes. Numbers of young men engaged in art crafts have applied for leave to join the school.

THE success which usually attends the annual opening *conversazione* of the Architectural Association has been surpassed by that of the gathering held in the Imperial Institute on the 7th inst. when upwards of one thousand guests were received by the President, Mr. H. O. Cresswell, and the Committee. The number of guests was in excess of that of former years, and the interest of this latest addition to South Kensington buildings no doubt attracted many. The Committee, with the valuable assistance of Mr. T. E. Colcutt, were fortunate in enlisting the sympathies of Sir Fred-rick Abel, Sir Somers Vane, and his courteous staff at the Institute, who cordially furthered the success of the function. The principal floor is occupied by the Fellows' rooms and offices, but the whole of the first floor was thrown open to the guests. In the east corridor an interesting exhibition of art metal-work was on view, whilst Messrs. Liberty occupied

the west corridor with an exhibition of Indian metal-work and fabrics. Mr. J. I. Robinson's collection of photographs, taken during the excursion to the Taunton district last August, attracted great attention, which the high quality of the work, now so well known, quite merited. The corridors were carpeted with the productions of Messrs. Cardinal & Harford, which were kindly lent for the occasion. Messrs. Mowlem & Burnett and Messrs. Harvey, Nichols, & Co., co-operated in the success of the evening. The building lends itself admirably to the purposes of a reception, and it will be even more suitable when the large staircase hall, which is now in course of erection, is opened. Until this is complete the secondary staircase is principally used. The principal points of the interior design are the staircase, the corridors, and the entrance hall. The entrance-hall is at present incomplete, and is partly occupied by a hoarded lift for the materials of the tower, but the corridors are open, and are good in proportion, and the sober softness of colour of the Hopton Wood stone dressings has a charm all its own. Needless to say all the architectural details received the careful inspection of members, and added much to the interest and enjoyment of the evening.

WE are glad to find that, under the bequest of the late Mr. Berridge, several institutions familiar to the readers of the *Builder* are considerably benefited. The Company of Plumbers receive 20,000*l.*, to be exclusively devoted to their scheme for educating, examining, and registering plumbers. The Sanitary Institute of Great Britain is to have 10,000*l.* King's College, London, obtains 10,000*l.* towards a Public Health Department; and University College, London, the same sum for a chair of Hygiene and an hygienic laboratory. These are not the only sums devoted to the improvement of the public health, though they are, perhaps, the most noticeable. The bequest must do a great deal to put English education in regard to sanitation on a firmer footing; for objects such as the above do not appeal to the generosity of the public in the same way as those which have the direct amelioration of other classes of inhabitants of this country in view. We hope that in no long time other bequests may follow to these institutions, for an improved state of the public health prevents many of the diseases which hospitals and similar institutions are established to contend with.

UNDER date of August 31 we have Dr. R. Bruce Low's report to the Local Government Board on an outbreak of typhoid fever in the borough of King's Lynn, Norfolk; and the cause assigned is rather significant at the present moment, when so much is being said and written about water-supply. It was to this source that Dr. Low has traced the outbreak. The water-closets of the place had been thought of as giving vent to specifically polluted sewer-air in and about houses, and as having thus conducted, perhaps, to dissemination of the fever. Now there are in Lynn some 2,300 water-closets, but no more than 1,600 privies; so that, on a hypothesis that water-closets operated in the above way to cause fever, a larger incidence of the disease was to be expected on houses having water-closets than on houses furnished with privies. But on investigation this was not found to be the case. Then suspicion fell on the sewers, especially one called the "dock culvert," which, owing to the flatness of the area it serves, and owing also to defects in its construction, is a "sewer of deposit." Moreover, it is tide-locked for several hours each day, and the means for flushing it are not efficient. As already stated, there are roadway ventilators in the course of this sewer, and when the wind blows from the westward into the mouth of the sewer, unpleasant smells are noted as emanating

from these ventilators. The defects of this sewer have been under the consideration of the Sanitary Authority for the last three or four years, and the Borough Surveyor has recommended that part of it be relaid. But the "dock culvert" serves a portion only of the town, and its service did not sufficiently coincide with the incidence of the disease, which is finally traced to water-supply from an open river, some characteristics of which are thus noted:—

"Some people in Lynn complain that after heavy rains the water is thick and discoloured, and that if allowed to stand it deposits a sediment and occasionally "stinks." Sometimes a dead eel or a small frog is found stuck fast in the water-pipes. The feeders of the river receive more or less directly the slop water of Grimstone Milling, while soakage from privy pits and refuse heaps, as also drainage from farmyards and horse-ponds, sooner or later find their way into these tributaries. Two of the springs rise directly from beneath Grimstone churchyard. In addition to the above sources of impurity, the slop waters from the hamlets of Roydon, Bawsey, and Pot Row similarly find their way ultimately into the stream. At Grimstone, and again at Roydon, I saw the overflow pipe of a cesspool, receiving contents of water-closets, discharging into a watercourse which flows into the Gaywood river. . . . In the course of my inquiries, I visited a market garden at Gaywood, about a mile or so above the intake. This garden has a frontage to the river of about 200 yards. On the surface of this garden I saw traces of town manure from the "tip" where privy filth is deposited; it had been spread on patches, about 19 yards from the water's edge. Failing to obtain definite information from the workers in the garden, I applied to the Corporation officials, who told me on referring to their books that this gardener had at times purchased town manure. . . . From what has been stated it is evident that the water in the Gaywood river has multifarious opportunities for becoming polluted by human excrement, not to speak of other impurities directly discharged into it or washed into the stream by heavy rains or melting snow. The filtering process, even if it were adequate, which it is not, cannot be trusted to prevent the danger of the specific fever poison thus passing into the town water mains."

The report goes on to give further and more serious particulars as to the manner in which infection from dwellings on the bank probably reached the river, and adds that the dangerous condition of the King's Lynn Borough Water has often been pointed out by the Medical Officer of Health, and that the Urban Sanitary Authority has more than once proposed to protect the water by piping it from a spring or springs, but this project has always hitherto been defeated by a section of the ratspayers who, ignorant of the dangers arising from the pollution of potable water by filth, regard the present supply as all that can be desired. All which is much to be noted at a time when so many water engineers are declaring that we can do nothing better than filter water out of open rivers.

LA Semaine des Constructeurs, commenting on the recent correspondence in our columns in regard to the Institute, and more particularly on Mr. Aitchison's letter, observes that England seems to be under the influence of a reaction in regard to architecture the reverse of what is taking place in France: i.e., the English are essentially a practical people and have long regarded architecture primarily as in the main a matter of practical construction, and the reaction is setting in the direction of placing architecture "sur le terrain purement esthétique." In France, on the other hand, the long prevalence of the ultra-classic view, which regarded construction as merely "affaire d'entrepreneur," is giving rise to a reaction in favour of giving more importance to pure science. This is probably the true explanation of the undoubted fact that the "reformers" in English and French architecture are now working in exactly opposite directions. In both countries, probably, the balance will re-adjust itself in time, though not without a good deal of temporary difference and disputation. *La Semaine* quotes, apparently with approval, Mr. Aitchison's summary of the position of architecture at the close of his letter.

WE regret to observe from time to time that architects occupying a good position in provincial towns, at all events doing a good deal of work, allow themselves to adopt the exceedingly unprofessional and undignified course of making up advertising broad-sheets consisting of sketches of the buildings they have carried out, and inserting them in letters. We received a few days ago a business communication from a well-known firm of architects in a large commercial city, containing a sheet of this kind, bearing the name and address of the architects, and covered with a collection of not very good sketches of buildings of (as might be expected) not very good architecture, for we can hardly imagine any one with the feelings of an artist adopting this mode of recommending himself to the public. This is not the first of such advertisement sheets which has reached us, always from provincial towns; we cannot remember ever receiving such a thing from a London architect, for in London at least this device for obtaining commissions would not be openly countenanced by anyone of any name or standing in the profession. We may point out that those who employ such a means of drawing attention to their works are lowering their own professional standing, and, as far as their influence extends, lowering the dignity of the profession.

IN *L'Architecture* for October 8 M. David de Penarun makes an impassioned appeal in favour of an obligatory diploma for architects, regarding the check which the movement has received in France as only temporary, and the diploma system as certain to triumph in the end. His main reason seems to be that it is the only means of stopping the practice of underhand commissions, which according to his statement would seem to be too common in France. M. de Penarun at all events complains that he cannot persuade ordinary persons that he, as an architect, is not getting rich on commissions from contractors; they say "what a first-rate profession yours is, making money all round!" and when he tells them that he has nothing to live on but his *honoraires* from his clients, they wag their heads and say "Oh, come, come, we know better than that, we know very well that you get commissions from contractors which come to much more than the client's fees," &c., and his protestations obviously leave them unconvinced. And M. de Penarun thinks there must be fire where there is all this smoke. Hence the profession by a compulsory diploma, he argues, and all this would be put an end to, and the black sheep turned out. The same number of *L'Architecture* contains an interesting article by M. Loviot on the works and career of the late M. Bailly.

THE collection of platinotype photographs by Mr. Hollyer, from the works chiefly of Mr. Burne Jones and Mr. Watts, now on view at the Egyptian Hall, forms a very interesting and charming collection, bringing together as it does so many beautiful designs by two very poetic artists in a form which gives their design and their balance of tone and much of their decorative effect, though without the colour, and enables us to compare together, in their essential qualities of design, many works the originals of which have only been seen separately and at long intervals of time. The works of Mr. Burne Jones, especially his rather lightly-executed studies such as the "Story of Orpheus," "The Winds," and others of the same type, come out beautifully in this medium; and the series of the story of Pygmalion is very successful, the photographs giving a better form of reproduction than any engraving could give, at much less cost, of course. We do not say this as disparaging the art of engraving, for which we have the profoundest respect, and which of course is both more powerful and more lasting than photography; but the quality of Mr. Burne Jones's work is what it is very difficult to do

justice to in engraving, while platinotype photography seems almost made for it. Among the photographs from Mr. Watts's works is one from the colossal "Eve" which excited so much speculation at the last Academy exhibition, and which permits us to see something of the upturned face of Eve, which, as the painting was hung at the Academy, could hardly be made out. There is an interesting collection of photographs after Mr. Watts's works, but photography does not do for these what it does for Mr. Burne Jones and, we may add, for Mr. Albert Moore, some of whose well-known works are admirably reproduced. In fact, it would seem that the more distinctly decorative a painting is in character, the better it comes out in photography.

THE *Revue Scientifique* for October 8 includes an interesting paper by M. Souriau, "La Representation des Couleurs," which leads up to an argument in favour of the employment of colour within certain limits in sculpture. The argument is rather a new one. Speaking first of colour in painting, he calls attention to the remarkable difference between the colour effect of any part as seen close to the eye and at a distance. On approaching the picture, "certains tons tres delicats ne se retrouvent plus; là où je croyais apercevoir tout à l'heure une carnation douce et unie, je ne vois plus qu'une couleur rougeâtre, zébrée de hachures vertes." This is no news to painters, of course, and certain painters, Mr. Mark Fisher, for instance, in landscape, and M. Henri Martin in figure-painting, have emphasised this changing power of colour combination in their pictures, by producing their effects mainly by means of separate touches of various colours which blend into the total effect desired. Applying this consideration to sculpture, M. Souriau argues that what we want is not colour but indication of colour. In looking at sculpture in bronze or marble we generally regard it as pure form, although both materials have their distinct colour; and M. Souriau admits (with every artist) that sculpture only shocks by a momentary illusion which emphasises the absence of the life which it professes to simulate. But the sculptor can adopt as conventional a colour as he chooses. "It is not a question of reproducing colour, it is a question of representing it, and that may be done in a relief by processes as suggestive, as artistic, as in a picture." The painter, in short, realistic as his picture may seem, does not paint the real colour of the living figure, he paints what represents it at the proper distance. Why should not the sculptor do the same? "Viennent grand artiste qui entre résolument dans la voie nouvelle, l'œuvre sera accomplie."

THE quarterly *Journal of the Royal Society of Antiquities of Ireland* contains an interesting paper on the once great Cistercian Abbey of Graignamanagh, by Mr. P. O'Leary and Mr. R. Cochrane, with a large plan showing the complete building, with the parts existing distinguished from those destroyed. The existing remains are quite sufficient to furnish a complete plan, except that the cloister arcade is apparently entirely gone (was it a lean-to roof, as at Netley?). The plan shows a church over 200 ft. in internal length, with the short choir and eastern transept chapels of the Early Cistercian plan. The writers remark that the similarity between the plan of Graignamanagh and that of Strata Florida would seem to indicate a closer connexion between the two buildings than would be implied by the merely general similarity of Cistercian plans.

THE exterior of Haddon Hall is fairly treated in the scenery of Sir Arthur Sullivan's opera; the garden front of the old house, with its picturesque bay-windows, the well-known steps from the terrace to the lawn, even the tree in the midst of the lawn, are all given with commendable correctness. It

is a pity the same respect was not shown to the interior architecture. The ball-room scene at the end of the second act is introduced in a very effective manner, but the architectural embellishments are such as were never seen in Haddon Hall; they represent rather the way in which a modern decorator might have got it up, with no archaeological architect to keep him in the true path. And what are we to say to the extraordinary statement about the ancient hall of Haddon, "which smiles there as it smiled even before the Conquest" (!); certainly a new architectural history for Haddon. We fear, too, that the student of the simpler and more obvious phenomena of nature may be apt to smile at that remarkable lightning in the storm in the second act, which flashes vividly and in such naturalistic scrawls, but throws no light at all over the landscape. As a general rule we have observed that lightning at night lights up the whole landscape for the moment, but here is a lightning which flashes in a dark night, and does not light up even the surrounding sky, nor throw a single gleam upon the scene, which would in fact be inconvenient when the scene-shifters are busy in preparing the ball-room scene at the back. For the thunder we have nothing but praise; it may rank among the most successful efforts in stage thunder; the more the pity that the lightning does not keep up the illusion.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

This Commission resumed its sittings* on the 5th inst., by examining, on behalf of the associated water companies, Mr. Hawksley, Sir F. Bramwell, and other engineers, as to the sufficiency of the companies' present and possible resources. We may perhaps usefully explain here that the evidence of the engineering witnesses called by the companies is intended to meet and rebut evidence laid before the Commission, on behalf of the County Council, in statements by Mr. Binnie. These are to the effect that the water in the rivers is insufficient in quantity to meet the future needs of London; that, if there were sufficient, it is impracticable to construct the deep storage reservoirs necessary to make it available; and that a large increase in the quantity pumped from the chalk would ultimately diminish the amount of surface water in the streams. We give here Mr. Binnie's statement with regard to storage reservoirs.

Mr. Binnie on Storage Reservoirs.

In a report to the London County Council's Special Water Committee in May last, Mr. Binnie said:

"During the late recess I made the following tour in the upper valley of the Thames. It may be interesting to note that of the total 3,512½ square miles of the Thames drainage area above the intakes of the water companies at Hampton, only 1,285½ square miles, or say one-third, is situated above Abingdon. On Friday, the 15th ult., I went up the Cherwell valley as far as Banbury. This valley is occupied by the main line of the Great Western Railway, which passes northwards from Oxford to Birmingham, and besides this there is canal navigation also constructed almost parallel with the line of railway. But apart from these circumstances I found no sites for reservoirs, but a highly cultivated and flat valley richly manured, receiving the whole of the drainage of such places as Banbury, Priors' Marston, Deddington. The Banbury water works, which I visited, draw their supply from a small steam or large ditch, and the supply was, neither in quantity or quality, of an inviting character. On Saturday, the 16th, I visited the Thame valley, which contains a certain, though small, amount of fairly good water, but the geological structure and configuration of the country are such as to preclude the construction of storage-reservoirs, besides which, the valley is richly manured and cultivated, and receives, more or less directly, the drainage of Thame, Aylesbury, &c. The Eweulode valley, from previous examination, I can state to be of a similar character to that of the Cherwell. The stream is small, and the

valley is occupied by the main line of the Oxford, Worcester, and Wolverhampton Railway. On Monday, the 18th ult., I proceeded up the main valley of the Thames to Fairford. The whole of this, I need hardly remind the Committee, is a flat and almost level valley of great width and fertility, and affords no site whatever for the construction of storage-reservoirs. From Fairford I proceeded by way of Cirencester to the source of the Thames at Thames Head, near Kemble Junction. I did not find any water rising to the surface at the spring, but about a mile and a half below it was being pumped by a steam-engine from an underground source into and supplying the summit level of the Thames and Severn Canal. At the time of my visit the water in the canal was flowing towards the river Severn and not into the Thames. On the higher reaches of the Thames in this neighbourhood it would be impossible to form storage reservoirs, as the geological formation consists of the open and porous limestone of the oolitic series. On Tuesday, the 19th, I went up the Churn valley to its source at the Seven Springs, a little south of Cheltenham. I should explain when I saw them about half a million gallons a day, but the stream rapidly increases from its source down to Cirencester. The configuration of the valley is in one or two places of a nature to suggest the suitability for reservoir sites, but the slightest inquiry into the geological character of the strata at once shows it to be of the usual Oolitic limestone type, which is perfectly open and unsuitable for the purpose. I also visited the river Colne, both at Fairford and its head waters to the east of Cheltenham. Here again the same remarks apply to the unsuitability of the valley for storing as I have made with regard to the Churn. With regard to the whole of these streams which flow down from the Cotswold Hills, it must be remembered that their basins are populated and cultivated, and that it is one of the driest districts in England, water having to be pumped for ordinary agricultural use, and stored in elevated tanks which are scattered on the limestone plateaux at the heads of the valleys. Consequently the supply of water to be obtained from this district would not warrant the construction of any large works, even had nature afforded the necessary facilities. On Wednesday, the 20th ult., I proceeded to Reading, and visited the valley of the Kennet, between that town and Newbury, and inspected the sites for reservoirs which had been suggested by Professor Robinson. I can but state, as he pointed out, that the valley is already occupied by that branch of the Great Western Railway which passes from Reading westward by way of Newbury and Hungerford parallel with the old Bath road, and that the Kennet and Avon canal would also have to be either purchased or re-constructed were the reservoir made as proposed. As to the reservoirs themselves, situated as they would be in a flat valley, they would never be of any great depth, and would, I feel sure, be the cause of swamps being created in the summer time, which, as the reservoirs received the drainage of Hungerford, Newbury, and a highly-manured country, could not prove but to be of the most unpleasant character. On Thursday I visited the valley of the Loddon, as it has been spoken of as a possible site for the construction of storage reservoirs. It is a rich agricultural valley, containing many beautiful parks and mansions, and although I traced its course up to its confluence with the Blackwater, I failed to find any suitable site for storage reservoirs. The stream itself has all the indications of discoloration due to draining a manured and thickly-inhabited district. As a general result of my investigation on this occasion, it more than confirms all that I stated in my report of September 1 last as to the impracticability of constructing storage reservoirs in the Thames valley, even were it considered prudent to use water flowing from so thickly inhabited an area for the supply of so large a city as London. In my geological investigation I was assisted by Professor Green, who met me at Cirencester."

We hold over for the present Mr. Binnie's statement as to chalk wells in and around London.

Evidence of Mr. Thomas Hawksley.

Mr. Thos. Hawksley, C.E., in the course of his evidence last week, said that he had constructed about 150 waterworks in the United Kingdom and abroad, and he referred the

Commission to the evidence he had given upon the London water supplies during the past forty or fifty years. His professional investigations led him to the conclusion that, in respect of both quantity and quality, the Metropolis is well supplied, and, with respect to future wants, even for a much longer period than fifty years, the existing sources of supply are abundant, and therefore need not be supplemented. The watershed of the Thames above Teddington is 3,676 square miles; the average rainfall between 28 and 30 inches, subject to a loss by evaporation of about 16 inches. In the driest years the rainfall is 19 or 20 inches, and the evaporation 14 inches at the most. Adopting 6 inches as the minimum annual yield, there is a mean daily flow of 877,000,000 gallons, being about nine times the quantity now taken by the Water Companies, and about twice the quantity Mr. Binnie, taking an exaggerated view, imagines may be required for fifty years hence. Therefore the dry weather flow may at any time be supplemented by the construction of equalising storage reservoirs, for the making of which there are ample facilities. A resort to distant sources is quite unnecessary, either now or hereafter. We may calculate upon a demand from the Thames of 25 gallons per head per day for six millions of people, making 150,000,000 gallons a day. Engineers consulted by the Conservators have found eligible storage grounds for 20,000 million gallons; the engineers consulted by the Grand Junction Company have planned other storage works for 18,000 million gallons; and these projects, which are practicable, do not exhaust the capabilities of the river. Assuming double the quantity to be required for supply, i.e., 300,000,000 per day, during a four months' drought; allowing fifteen other days for a flood period; assuming that a minimum of 200,000,000 gallons pass over Teddington weir—an unnecessary quantity because the tide sometimes overtops it—the proposed impounding and settling reservoirs near Staines will effect these objects, as also will only a fifteen days' storage at Staines, if combined with other storages in the upper reaches of the river. These storages may be made from time to time when and as occasion may require, so that no amount of dead capital need be expended. During the drier period of the year, all the water coming down the Thames to Teddington is spring water, and the minimum on a week's average is about 300,000,000 gallons a day. If, therefore, the companies were to add from their reservoirs 200,000,000 gallons a day, the 500,000,000 for themselves and the weir would be realised. This could easily be done; but no such quantity will ever be wanted. In the driest summer recorded, 1884, only 103,000,000 gallons per day would be wanted on the average during 168 days to satisfy both Mr. Binnie and General Scott fifty years hence. He would pump into the reservoirs from the river enough to keep the water fresh and in its best condition. The drainage area of the Lea valley was about 500 square miles, and the annual yield 4 in., which gave about 80,000,000 gallons a day, to which must be added 10,000,000 gallons drawn from the Thames by the New River and East London Companies, and an unknown quantity pumped from the chalk, whilst 5,000,000 must be deducted for navigation purposes. The companies may obtain in the driest seasons from 90,000,000 to 100,000,000 a day, and let July they were distributing 82,000,000, exclusive of 5,000,000 from the Thames and 3,000,000 from other sources. The future capabilities of the companies may be much increased by making impounding works in the head valleys of the Thames and Lea, or either of them. The area of the chalk in the Kent Company's district will afford any needed supply to the population therein, however much it may increase in the next fifty years. It would be imprudent to spend 30,000,000, or 40,000,000, in deriving a future supply from sources nearly two hundred miles away. The good effects of the London supplies are well recognised, but what might be the result of the substitution of the Welsh water can only be inferred. It acts on lead pipes, corrodes iron pipes, and is sometimes peaty. The populations in the river areas are sparse, being about one to two and a half acres, whilst in England generally there is one person to about an acre. Very little obnoxious matter is received into the rivers, and the oxidising power of river water is so great that no appreciable quantity of organic matter remains in solution. The death-rate of London shows that it is the healthiest city, not only in this king-

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 603; and current volume, pp. 19, 29, 47, 71, 82, 103, 126.

om, but in all Europe. Asiatic cholera is not occasioned by water supply. The sanitary supervision of the Conservators may be improved by extending their powers to the heads of all tributaries, and by appointing a larger number of inspectors. For this service the companies ought to make larger contributions to the funds of the Conservancies. He handed in a table showing from 1882 to 1891 the death-rates in London and twenty-seven large towns in England, divided into two groups: towns supplied with hard water and those supplied with soft water. The mean for fourteen towns supplied with hard water was 20.2 per 1,000 persons, compared with 19.9 for London. For thirteen towns supplied with soft water the mean was 23.0. In twenty-five cities at home and abroad the mean is 25.5, or an excess of 5.6 per 1,000 over London.

Reminded that, if the present estimate of population were correct, and the companies' statements of what they supplied were correct, it amounted to a little more than 92 gallons per day, he said that was so; but the companies did not take any care of the interiors of the houses, and there was very large waste. This occurred in every town where there was a change from the intermittent to the constant system. But in the best-managed towns the quantity never exceeds 25 gallons per head, and rarely goes beyond 20. His calculations were based upon control more strict, or, rather, more reasonably careful than the present control. With the introduction of constant supply in London the management had not been changed, and many cisterns were left to overflow. There would be no difficulty in bringing the consumption within 25 gallons per head, but it would take some time. It might require the inspection of fittings once in six months. There were plenty of towns which were East London in their way, and he had had no difficulty in dealing with them. There was nothing peculiar in East London; it was only a question of management. There might be a large trade consumption there, and it might increase; but the metropolis generally was not a manufacturing place. Storage reservoirs furnished one means of supplementing supply, and the Commission would hear a great deal about that from gentlemen who had designed reservoirs of which he approved; but he was not quite sure whether in one or two cases the ground was so entirely eligible as these gentlemen thought. It must be made water-tight as a matter of course, and above Woodstock there was some doubt as to whether the ground was quite suitable; but in the valley of the Thames there were plenty of places that were, and he had been to a place which almost alone would supply the whole quantity. This was a few miles from Oxford, on the main stream of the Thames. He had not schemed anything of the kind himself; he had not been called in for the purpose. Amongst others there would be called Mr. Etheridge, a geologist, who had gone into the question very minutely.

In explanation of what he had said about the use to be made of a storage reservoir at Staines, he handed in a table which showed that in five months of 1884 there were 153 days on which the flow of the Thames fell below 500,000,000 gallons a day, to which General Scott would add fifteen days for the passage of flood water. The 153 days would need a storage of 12,868,000,000 gallons, and the fifteen days a storage of 4,500,000,000 gallons, making a total of 17,368,000,000 gallons that would have to be provided for the 168 days. This was the greatest provision there was any necessity to make by storage reservoirs. The water could be got from the Thames when the river was delivering more than 300,000,000 gallons; and it could also be got, if there was any deficiency at Teddington Weir, to make the flow up to 200,000,000 gallons. The cost of the reservoir at Staines was estimated at 4,000,000l. or 5,000,000l. He did not propose that water should be in a reservoir unchanged for four months. He proposed that during dry weather, when the Thames was in its best condition, water should be pumped into the reservoirs in sufficient quantities to keep the water perfectly fresh, but not in the quantity in which the water was taken out. He had not considered the objection which was raised to interfering with the actual flow of water in streams and rivers, because he supposed that if storage reservoirs were constructed provision would be made for the proper quantities of compensation water to be given out. Where-

ever compensation water was given it presupposed the impounding of other water which diminished floods and increased the stream during dry weather. The water that would be taken into the storage reservoirs would be good water, without any admixture of flood water. The river would be supplemented from the reservoir in the Staines basin; but the supplemental quantity for the river is only a small part of the whole. From other reservoirs water would be brought down in pipes to the pumping stations, unless there were pumping stations at the reservoirs.

In explanation of the estimated yield of the drainage area of the Lea in years of minimum rainfall, he handed in the following statement:—

August, 1887. Taken by New River Company	22,400,000
(Mullinam). Taken by East London Company	28,000,000
July, 1892. Pumped by New River Company	18,200,000
July, 1892. Pumped by East London Company	2,800,000
Realised quantity	68,000,000
Additional capabilities of existing wells—	
New River (Francis) by pumping alone	21,000,000
East London (Bryan) by pumping alone	3,000,000
	24,000,000
	90,000,000
Add by storage, say	19,000,000
	100,000,000

This estimate applies to the minimum dry weather months. At other periods more may be taken from the river and less from the wells. It was possible Mr. Francis might have over-estimated the future gain from the sinking of wells, and taking off 10,000,000 would reduce the total to 90,000,000; but the East London had power to take 10,000,000 from the Thames. When he spoke of 80,000,000 gallons a day as the mean natural yield of the Lea Valley, he did not include what could be got from wells and springs. This was in the chalk, which was merely a cistern, and was available in the dry years. It was pointed out to the witness that the Companies' estimates of what they could get in a dry year from the river were:—East London, 30,000,000; New River, 22,500,000; total, 52,500,000; and when it was put to him that 80,000,000 was more than the Companies had calculated, he said, "Very well; so much the worse for the water companies."

Asiatic cholera, he said, could be communicated by water, as it was in the case of the Golden-square well, the water of which was highly polluted and had no means of being purified by natural oxidation. Water of that kind would communicate cholera, providing cholera germs were present. But that case was a very different one from that of a large river. It was said that if there was a case of cholera at Oxford London would be decimated; but such things did not happen. The rivers were self-purifiers by an oxidising process, and nothing that was offensive put into a great river in small amounts would reach the lower parts. It was a very remarkable fact that cholera always went up rivers and did not come down them. He did not dispute the general statement that cholera was propagated by impure water.

The filter-heds, he explained, do not act merely as sieves. The minute floating particles in the water would all go from the top of the filter-bed to the bottom of it were it not for the attraction of the particles of the sand for these bodies which move sideways and attach themselves. The water is purified in that way to a much greater extent than it is purified by the mere sifting process. He explained this forty years ago to Dr. Angus Smith, who entirely agreed with him.

If an effluent were sufficiently purified, there was no reason why it should not go into the Thames and be taken out afterwards for domestic purposes, subject to natural purification and good filtration. The Thames watershed was a suitable one for the supply of a town, provided there were a proper inspection of the sources of pollution and the water were properly filtered.

There is a proportionately greater quantity of water to be got by pumping in the area of the Lea than in that of the Thames, because a large part of the Thames is impervious, and the water does not get from the impervious portion into the chalk, but it gets into the river. In the Lea area, besides the surface water which is in the river, there is a large supply of water which lies in the chalk as in a cistern, which is

available by pumping during the dry season, when the natural flow of the stream is comparatively small. All the water that is accumulated in the chalk is abstracted from the streams, and the chalk is a mere equalising area. If the demand in the chalk were very large, some water must go from the streams to supply that demand. Every drop that is obtained from the chalk is originally surface-water, but it gets into the chalk in wet seasons and leaves flowing down the rivers the quantity which is calculated upon from the gaugings. If a very large quantity were pumped out of the chalk reservoir, the streams would not continue in the same volume; and he had based his calculations on the minimum that would be left in the streams. All these calculations related to four or five months of dry weather. At other periods there is more water than anybody wants. As there are reservoirs on the Thames, all the water that comes down in dry weather must be furnished by springs; and this is due to the large tracts of oolite and chalk in the watershed. The Severn and the Trent produce in dry seasons almost the same minimum quantity per acre as the Thames.

Questioned by Mr. Mansergh, Mr. Hawksley said that if 300,000,000 gallons a day came down to the intakes, if 100,000,000 were taken by the Companies, and 200,000,000 were allowed to go down the river, no harm would be done to the river. If the figures were reversed, and only 100,000,000 were allowed to go down the river, the river would practically go down at its present dry summer level by the weir; the surface would be lowered an inch or two, and the speed of the flow would be diminished one-half; and in that state of things no harm would happen to the river. In the 4½ miles stretch of river, between Molesey and Teddington, there might be a very little more deposit, which might either be dredged out or washed out by floods. The new weir, 400 yards below Richmond Bridge, was to maintain at Richmond the level at low water 2 ft. 6 in. higher than now; and no harm would be done to that stretch of river. No salt water would get above the bridge; but the sluices being drawn open, the tide would back up the fresh water. The abstraction of the extra 100,000,000 gallons might alter the level an inch or two, when the tide did not overflow Teddington weir; when it overtopped the weir, it would have no effect whatever. Below this new work the abstraction of the 100,000,000 gallons would lower the water-level for two or three hours at the end of the ebb; and there would be an insignificantly smaller amount of silt leaving a deposit that could easily be dredged out.

In reply to Professor Dewar, he said he knew of no case where "a potable water supply filtered by sand filtration properly conducted" had ever led to any epidemic; and he could tell some remarkable stories of the mistakes that have been made by specialists. The question was repeated with reference to "proper sand filtration applied even to a polluted water." The witness said that waterworks are not made on polluted streams. Among his cholera experiences was a severe attack at Wolverhampton and Willenhall. One of the Birmingham water supplies was then derived from the river Thame, which flowed through Wolverhampton, Willenhall, Walsell, and other places; but there was no cholera at the time in Birmingham. The question was altered to "any case where a potable water supply derived from a river flowing through populous districts after filtration has resulted in any epidemic," and the witness said that speaking generally he knew of no such case. There were good and bad filtration; but if you allowed only 50 gallons a day to go through a foot of surface you need never be afraid of any microbes or epidemics.

Asked by Mr. Mansergh whether he knew anything of the epidemic fever at Bangor five or six years ago, which was attributed by the officer of the Local Government Board to the water supply, the witness said he must not comment on that Board,—that was not his business,—but he could tell of some grave mistakes they had made.

Questioned by Sir A. Gekie, the witness said he was quite sure there is proportionately a much larger extent of impervious strata in the Thames district than there is in the Lea district. It was as an engineer he expressed the opinion that there would be no difficulty in finding sites for reservoirs in the valley of the Thames. He was tolerably well acquainted

with the Thames watershed; the lower portion he knew very well; and last week he spent three days in the upper portion. The site above Oxford was a good one if it was wanted, but he had an idea that such a large reservoir would never be required. As an engineer, he thought there would be no difficulty in finding sites where there was no pervious material below, or where, at all events, it could be got rid of; he could find them, and he supposed other engineers could find them as well. In the site above Oxford, the material below the surface would be Oxford clay. It would be near the river, which would be crossed by an embankment, and the puddle wall would have to pass through the drift. There is not much drift there; you are down on the clay almost immediately; but if there is drift, that is no difficulty, although it is a source of expense in having to go through it with the puddle wall. Sir A. Geikie said there was considerable difference of opinion as to the feasibility of constructing storage reservoirs up the valley of the Thames, and the witness said "There is no difficulty."

In conclusion, the witness said, in reply to the President,—"I am not here on anybody's behalf. I have desired not to appear here, but I have been forced, because I received a letter on behalf of the water companies, and they insist on my appearance."

Evidence of Sir P. Bramwell.

Sir P. Bramwell, in the statement upon which he was examined, divided the seven companies, excluding the Kent, into those that were supplied solely from the Thames Valley,—the Chelsea, Grand Junction, Lambeth, Southwark and Vauxhall, and West Middlesex,—and those which depend mainly upon the Lea Valley,—the New River (entirely from the Lea Valley), and the East London (supplied partially from the Thames Valley). Having regard to the fact that Mr. Ayrton's Committee on the East London Water Bill of 1867 made a prediction as to the increase of population, which has turned out to be incorrect to a very serious extent, it is practically impossible to form any accurate opinion upon the increase of population at any given remote period. The statistics of Mr. Lass show that between 1866 and 1890 the increase in the water supplied has not been as rapid as the increase in the number of persons supplied, the average having fallen from 24.3 to 31.09 gallons per head per day. At that rate per head, with the rate of increase of population continued, by 1896 the five companies would, in 1896, require the 100,000,000 gallons contemplated by Mr. Ayrton's Committee as likely to be required in 1926. As to cost, that Committee say that, at 5 per cent. interest, any money expended on a work not needed for sixty years makes that work eight times as costly as it would be if executed at the time when it really became necessary. To the 100,000,000 gallons must be added the 4,000,000 taken from the Thames by the East London Company, likely to be augmented, and a possible 3,000,000 gallons, which the West Surrey Company have power to take, so that by 1896 the draught from the Thames for waterworks purposes will be 107,000,000 to 108,000,000 gallons daily average. For the seven companies the figures of Mr. Lass show that between 1866 and 1890 population had increased 85.6 per cent., and supply 82.5 per cent., as compared with 106.5 per cent. population, and 87.3 per cent. for the five companies. Tables (handed in) show that in the case of the Lambeth Company the increase in the population was 186 per cent., while in the case of the Chelsea Company it was 407 per cent. In daily average supply the East London had increased 119 per cent., and the Chelsea 24.4 per cent. He naturally felt great hesitation in putting forward any estimate of the population forty years hence. To aid in forming such an estimate he compiled from the book of Mr. Lass two tables showing, first for the seven companies separately, and then for the seven companies combined, the average number of supplies, and their annual increase from 1881 to 1890. Dividing the population by the supplies gives 7.6 persons per supply in 1881, and 7.45 in 1890,—a difference of only .15 of a person per supply. For all seven companies the rate of increase in the number of supplies per annum has been decreasing, especially during the last few years. According to the figures of Mr. Lass, the trade or meter supply varies from 7.33 in the case of the Grand Junction, to 5.5 in the case of the Kent, and averages generally 6.133 gallons per

head. For purely domestic purposes 17 gallons suffices in the district of a water company 16 miles from London, with good property, baths, and gardens, and very little trade consumption. The supply is constant, the district hilly, the pressures high, and the fittings necessarily efficient. The average per head of the eight companies for domestic purposes is 24.78; but the New River gives 22.61 with about 40 per cent. of its horses upon constant service. Generally there was no reason why the domestic consumption should not be reduced to 20, with 6 for trade purposes, making 26 gallons per head as the total average per head. Making allowance in the returns of the companies for short stroke of engines, slip, and water used in sand washing, he dealt with the companies serially. The future of the Chelsea Company may be predicted with some certainty. In forty years it may raise the number of its supplies by 35 per cent., and, at the present quantity for supply, the daily delivery would average 135 million gallons. If need arose, the supply of over 23 gallons a head for domestic purposes could be diminished. Entitled to draw 22,000,000 gallons per day, the company will have a large surplus. The Grand Junction, having 56,242 supplies in 1890, may reach 97,000 in forty years, and might bring down the average per supply to 240 gallons, thus calling for 23.25 millions. It has power to draw 24,500,000, so that, with reserves, it would have a sufficient margin between maximum and average. The Lambeth Company's supplies may increase from 91,162 to 163,000, and the average may be reduced from 29.1 to 26 gallons, calling for a total of 30,000,000. It can take 24,500,000 from the Thames, and 5,000,000 from springs in the gravel, whilst some of its lands will yield deep-well water from the chalk. The maximum has not exceeded the average by more than 3,000,000 gallons, and the future difference could well be supplied from storage reservoirs. The supplies of the Southwark and Vauxhall may increase from 112,269 to 153,000, and, assuming the average per head to be reduced to 26 gallons, there would be needed 30,000,000—5,500,000 in excess of what the company have power to draw from the Thames. It is obvious, therefore, that from some source, such as wells in the chalk, an augmentation of the present supply of the company will be needed. The West Middlesex may increase the number of its supplies from 73,230 to 125,000, and, at 26 gallons per head, this absorbs the 24,500,000 that can be taken from the Thames. The variation between average and maximum is small, and there ought to be no difficulty in dealing with the question by means of storage reservoirs. Having regard to the fact that in forty years the Chelsea Company should need 8,000,000 gallons less than it can take, and that by vigilance the companies may reduce the average consumption per head, the five companies collectively might be able in forty years to carry on their business without more than a mere trifling augmentation of their present quantity from the Thames. If this view be too sanguine there would be no objection to allowing them to draw the needed greater supplies from the Thames. A further 50,000,000 gallons a day Teddington weir could not complain, because in short water seasons the level is governed by the crest of the weir. The inhabitants for 3 miles below Teddington could not complain, because there was being provided the Richmond foot-bridge, with weirs to hold up the water to the level of half-tide. Parliament could not complain, because it had authorised the holding back of the lower part of the tidal flow between the new foot-bridge and Teddington weir. The New River Company's supplies might increase from 153,488 to 213,483, which, at 26 gallons per head, would require 33,000,000 be 46,500,000 gallons. It has available 56,500,000,—22,500,000 from the Lea, and 34,000,000 from springs; and it would be practicable to provide storage for equalising deliveries, as has been done by the East London Company. There is not any ground for the fears that the pumping of the company will prejudice the supplies of other local undertakings; but the company might very well buy them up at a valuation.

As to the general question of a supply from the chalk, he called attention to the evidence of the late Mr. S. C. Homersham, before Mr. Beckett's committee in 1852, especially in reference to the Watford Spring Water Com-

pany. He produced a set of drawings and a map prepared for Mr. Homersham by Mr. W. A. Bonlouis, an architect still in practice. A many as twelve pairs of watersheds are exhibited,—one pair on chalk, the other on clay. The point of observation was always a bridge spanning a stream. In clay districts the bridges contain two or three arches, and the height of the water varies greatly. On the chalk only a single arch is needed, the variation in level is small, and there is never any flooding. The aggregate area shown in the drawings is several thousand square miles. In the clay districts there is over one mile of stream per square mile; in the chalk districts less than half a mile. The drawings and map are prepared to show the committee that, the rainfalls being equal, the water which in the chalk districts did not appear on the surface of the ground as it did in the clay districts, must have sunk into the chalk. A mass of evidence was given as to where this chalk water was finally delivered; and it was proved that there were numerous instances round the coast where, at all times of the tide, this fresh water was seen to escape, that in a still larger number of instances the escape was visible only at low water, and, although not visible, no doubt was felt that the escape went on vigorously below the level of the lowest low water. Thus the pumping from deep wells in the chalk draws its supplies from subterranean waters which are travelling either in defined underground channels, such as fissures, or are permeating the mass of the chalk on their way from the place of their absorption to the point of their delivery. Another proof of this is offered by the slope of the surface of the subterranean chalk water from the place of absorption in the high ground to the point of delivery at the sea. The surface of the water on the Chiltern Hills or at Caterham is 300 ft. or 400 ft. above the level of the sea. The difference in the levels which represent the differences in the working "head" can only be explained by the fact that the chalk is not a mere water-logged reservoir, but is the site of innumerable subterranean channels, large and small, conveying the water from the place of its absorption to the sea-level.

We defer until next week the continuation of the report of the examination of Sir P. Bramwell.

COMPETITIONS.

PUBLIC BATHS, WALSALL.—We are informed that the Council, after careful consideration of the twenty-five sets of plans received in connexion with the above competition, have awarded the three premiums as follows, viz.:—first, Mr. Horace T. Bonner, of London; second, Mr. H. H. McConnell, of Walsall; third, Mr. Samuel Lorton, of Walsall.

HIGHER GRADE SCHOOL, STOCKTON.—At the meeting of the Stockton School Board on Monday evening last, the Chairman (Mr. James Wright) called attention to the fact that the designs for the Higher Grade School were on view, and that it was proposed to exhibit them in the vestibule of the Borough Hall. Mr. Robson, the Architect to the Education Department, had given his award, in which he had placed first the designs of Mr. Bottomley, architect, Middlesbrough, whose motto was "Respect Finem"; Messrs. Clark & Moscrop, Darlington ("Ad Rem") next; and Mr. Richardson, of Stockton ("Martin Chuzzlewit"), third. A meeting would shortly take place with Mr. Bottomley, the successful competitor, when the final arrangements would be made to get out working drawings, so as to proceed with the building at once.

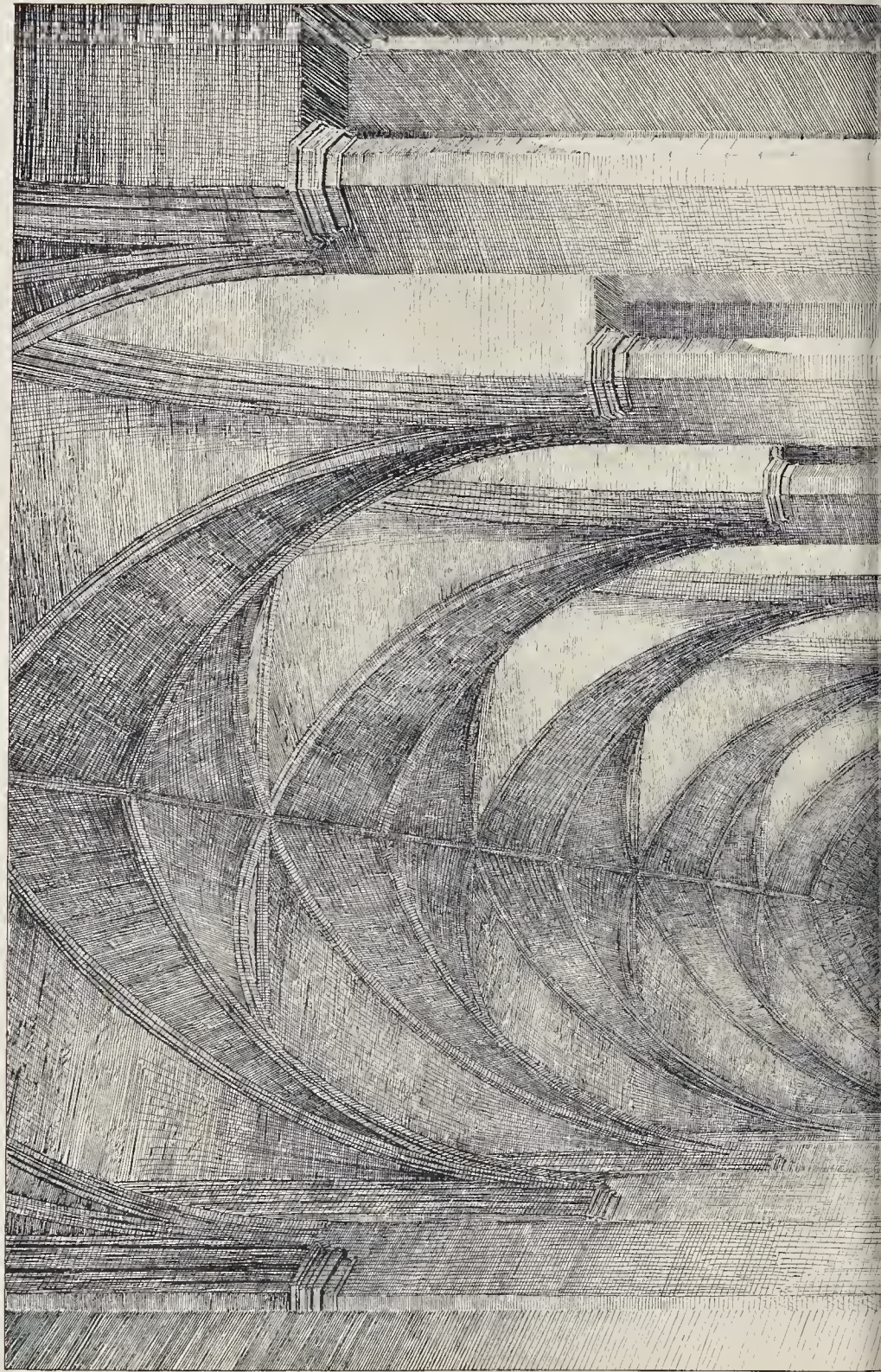
ASSEMBLY ROOM, AMBLESIDE.—We are informed that the designs of Mr. Robert Walker, architect, of Windermere, have been placed first by the committee.

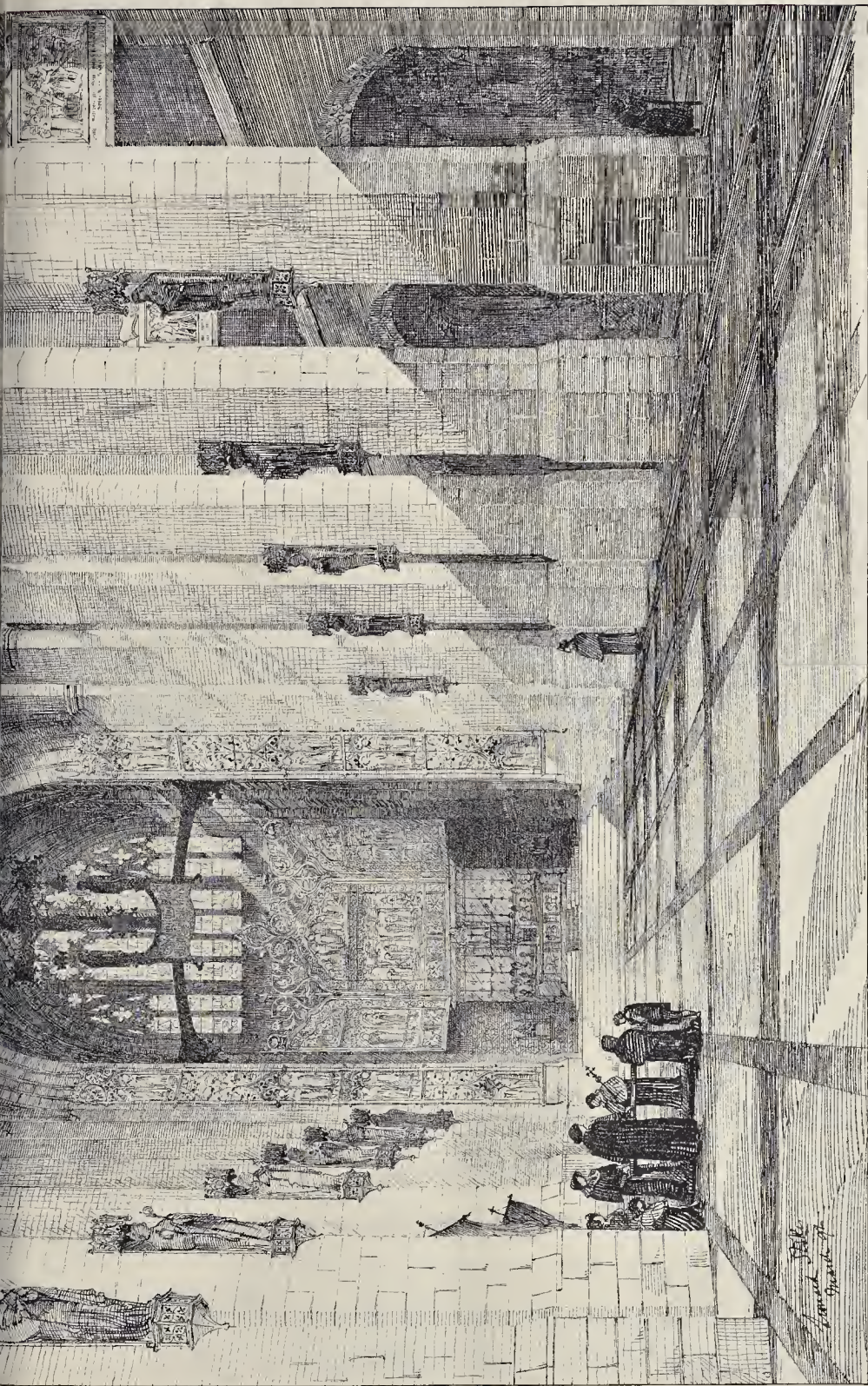
AVENUE-ROAD SCHOOL, NORWICH.—The Norwich School Board, at their meeting on Friday, the 7th instant, awarded the three premiums to the authors of plans as follows:—1. Mr. C. J. Brown, architect, Norwich (Surveyor to the School Board), selected to carry out the works. 2. Fifty pounds to Messrs. George J. Skipper & F. W. Skipper, architects, Norwich. 3. Twenty-five pounds to Mr. W. Landless, of Leeds. There were thirty-two sets of plans submitted.

FREE LIBRARY, WIDNES.—The special committee of the Widnes Local Board, acting on the advice of their assessor, Mr. Hartley, of Liverpool, have awarded the design of Messrs. Woodhouse & Willoughby, of Manchester, the



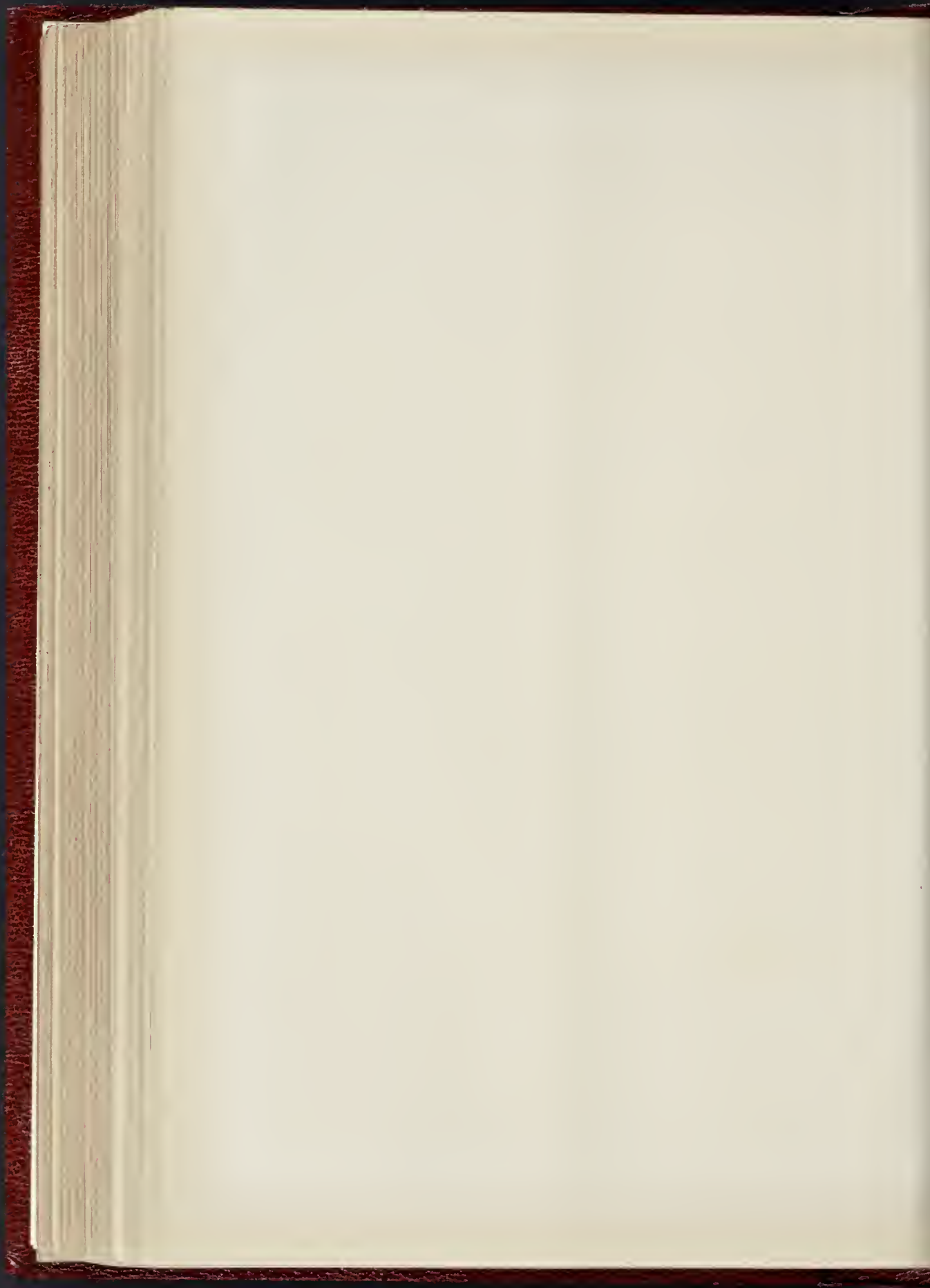
THE BUILDER, OCTOBER 15, 1892.





THE PHOTO BRAGUE & CO. 45 EAST HADDING STREET, LONDON E.C.

INTERIOR, NEW CHURCH, MILES PLATTING, MANCHESTER.—MR. LEONARD STOKES, F.R.I.B.A., ARCHITECT.



premium for the proposed free public primary and technical school. The second premium has gone to Messrs. Briggs & Wolstenholme, Blackburn; and the third premium to Mr. C. O. Hillson, of Liverpool. The competition was an open one.

PUBLIC OFFICES, &c., SHEPTON MALLET.—We understand that in the competition for the Board Offices and Technical School, the thors of the selected design, under motto "Mid - Somerset," were Messrs. George J. Lipper & F. W. Skipper, architects, of Norwich; the design placed second, under motto "Merlin," was by Mr. Silcox, of Bath.

ARCHITECTURAL SOCIETIES.

THE (LONDON) ARCHITECTURAL ASSOCIATION.—The following is the syllabus of meetings of this Association for Session 1892-93:—October 21, Annual General Meeting; Address by the President, Mr. H. O. Cresswell.—November 4, Paper by Mr. W. Young, entitled "Notes on the application of an Architectural Invention."—November 18, Paper by Mr. Paul Atterhouse on "Some Mysteries of Modern Architecture."—December 2 and December 16 (subjects to be announced).—January 13, 93, Paper by Mr. R. Phené Spiers on "The Influence of Byzantine Art in Italy from the Sixth to the Twelfth Century."—January 27, Paper by Mr. Sydney Vacher on "The Small suburban House."—February 10, Paper by Mr. J. Tait on "The Value of Criticism."—February 24, Paper by Mr. A. E. Street on "Individuality and Originality in Art."—March 10, Paper by Mr. G. H. Fellowes Pryne on "Screens, their Treatment and Symbolism."—March 24, Paper by Mr. J. A. Gutch "In praise of a Country Practice."—April 14, Members' Soirée.—April 28, Paper by Mr. P. Gordon on "Hygiene in its Application to the arrangement of Buildings."—May 12, Nomination of Officers; Paper by Mr. E. Gray Dawber (subject to be announced).—May 26, Election of Officers; Paper by Mr. T. A. Sladdin, "The Travelling Student's Notes."—May 31, Annual Dinner.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held in the rooms, West Campbell-street, on the 4th inst., the President, Mr. Alexander McGibbon, A.R.I.B.A., in the chair. An interesting paper was read by Mr. Wm. J. Anderson, the subject being "The Street Architecture of Modern Glasgow." The essayist pointed out some of the characteristics peculiar to the city, and comparison was made with some English and Continental towns, as to mode of laying out streets to the best advantage architecturally. Reference was made to the traditions handed down by the older architects, and to the influence of the work of their successors, and with what results. A criticism of some of the more recent buildings was then given, pointing out their merits and defects. Mr. John Keppie, A., opened the discussion which followed, and at the close the usual vote of thanks was awarded the essayist.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of this Council as held on Tuesday afternoon last, the Chairman, Mr. John Hatton, presiding.

Resignation of a Member.—The Clerk reported the receipt of a letter from Mr. F. C. Bann resigning his seat as a member of the Council.

Proposed Ferry from Rotherhithe to Limehouse.—The Bridges Committee presented a report, the first paragraph of which was as follows:—

"We have again considered the subject of providing means of communication across the river east of London Bridge, between Rotherhithe and Limehouse. Since our report was first submitted to the Council, we have received deputations from the Vestry of Rotherhithe and the Vestry of St. George's-in-the-East, and have had an informal interview with certain members of the Thames Conservancy Board on the subject of the proposed ferry. We have also received memorials from the Vestries of Rotherhithe and Bernoldsey, and a communication from the Vestry of Camberwell, asking that a crossing may be made. The Vestry of St. George's-in-the-East is anxious that a ferry should be formed, but that it should run direct across the river. This, as we pointed out in our former report, would necessitate the widening of Old or New Gravel-lane, in order to form an

adequate approach to the ferry on the north side, as well as the reconstruction of a swing-bridge which crosses the London Dock. Apart from the consideration of the large sum of money that would have to be expended in widening either of the lanes, the fact of a draw-bridge being in the line of the approach to the ferry is, in our opinion, a great obstacle to the adoption of such a scheme by the Council. At our interview with members of the Thames Conservancy Board, we were informed by Sir Richard Nicholson, the Deputy-Chairman of that body, that the Conservancy would object to any ferry in this part of the river, as it would be an impediment to the traffic, and he suggested that a tunnel should be made instead of a ferry. We regret that this view should be expressed by the river authority, but we are of opinion that it should not prevail with the Council, whose duty it is to meet as far as possible the pressing needs of the inhabitants on both sides of the river below London Bridge. Commerce is now hampered by reason of the people having no means of crossing the river free of toll except at London Bridge or Woolwich Ferry. We think that this state of affairs ought not to be allowed to exist, and, to prevent any further delay, we have suggested a ferry of such a carrying capacity as will afford great facilities to the traffic and to the inhabitants on both sides of the river. We, moreover, think that the ferry we have suggested will not seriously interfere with the navigation of the river, as the ferry-boats will run up and down the river, and not directly across. We think it important, as bearing upon any objections which may be raised by the Thames Conservancy Board to our proposals, to remind the Council that some years ago there was a toll ferry direct across the river close to the spot which we propose for the southern end of the ferry. For these and many other reasons we have unanimously come to the conclusion that it is the duty of the Council to apply for power to construct such a ferry as we suggest. We therefore submit the following recommendations for adoption:—

(a) That, subject to an estimate being submitted to the Council by the Finance Committee as required by the statute, a ferry be formed between Rotherhithe and Ratcliff, and that the pontoons and approaches be made as the sites shown by red colour on a plan submitted by the Committee.

(b) That the Parliamentary Committee in conference with the Bridges Committee be instructed to prepare a Bill to be introduced in the next session of Parliament, authorising the formation of the proposed ferry.

(c) That the Bridges Committee be empowered to prepare the necessary plans and estimates to be laid before Parliament.

The Hon. Richard Grosvenor, Chairman of the Committee, in moving the adoption of the report, said the estimated cost of the scheme was 418,000£—four ferry-boats, 205,000£; North and South approaches, 177,000£, and compensation, 36,000£. The ferry would cross obliquely, the Middlesex position being at London-street, Ratcliff, and the Surrey position being at Newport-street, Rotherhithe.

Mr. J. W. Bann, M.P., criticised the proposal of the Committee, on the ground that the Limehouse pontoon and landing-place would be 1,500 yards lower down the river than the Rotherhithe pontoon and landing-place. He argued that owing to this fact the ferry would be very costly in working, a larger number of ferry steamers being required than for a direct crossing, and he spoke of the dangers and delays that would arise during the working of the ferry in foggy weather. On these and other grounds indicated by him he moved the following amendment:—

"That the recommendation be referred back to the Committee, with instructions to report to the Council as to the cost of a direct ferry with suitable approaches on the northern side of the river."

Mr. Martineau seconded the amendment, and a long discussion ensued, in the course of which it was contended, in support of the Committee's proposals, firstly, that the places selected by them for the ferry stations were the only points available, having regard to the presence of docks on each side of the river and to the safety of the navigation; and secondly, that the proposed ferry really "followed the course of the trade,"—in other words, that the bulk of the heavy vehicular traffic, passing by London Bridge from the East End to the south-east of London, and *vice versa*, was from the neighbourhood of the two points designated by the Committee for the ferry stations.

The amendment was rejected, on a division, by 60 votes to 49.

Other amendments in favour of postponing the project having been rejected.

Mr. Leon moved, on the motion to adopt recommendation (a), that the following words be added:—

"And that it be referred to the Improvements and Bridges Committees jointly to consider and report as to the necessity of widening and improving the approaches other than those named, near the proposed northern ferry terminus."

This amendment was rejected on a show of hands, and recommendation (a) was adopted.

On the motion to adopt recommendation (b), Mr. Costelloe moved that the following words be added:—

"And to provide that such proportion of the cost as may be equitable shall be raised by way of an improvement rate on the owners of ground values in the County of London, instead of the whole cost being thrown on the occupying ratepayers."

This was agreed to, but a further amendment, moved by Mr. Beachcroft, to add to the words of Mr. Costelloe's amendment the words "and that the ferry shall not be proceeded with until such provision is made," was rejected.

The recommendations of the Committee, as amended, were then agreed to.

Election of an Alderman.—The Chairman announced the result of the election of an Alderman, in succession to Lord Hobhouse (resigned) to be that Earl Compton had been elected by 58 votes against 31 given to the other candidate, Mr. William Phillips. (Both candidates were members of the first Council.)

Blackwall Tunnel Approaches: Working-class Dwellings.—The same Committee also reported as follows as to the erection of workmen's dwellings for re-housing the people who will be displaced by the construction of the approaches to the Blackwall Tunnel:—

"The Council has referred to us several tenders for the erection of the artisans' dwellings on the Yabsley-street site.* On further consideration we think that it would be more economical if the Council were to erect the buildings; by so doing it would save the extra cost which would be recovered by the contractor's profit, and also the expense of supervising the work. The Council, moreover, could rely upon having the best materials and workmanship, and at the same price that would be charged in the first instance to contractors. We therefore recommend—

"That the Council do erect the artisans' dwellings to be constructed in connexion with the Blackwall Tunnel scheme without the intervention of a contractor, and that the Bridges Committee be authorised to take the necessary steps for carrying out this recommendation."

On the presentation of the report Sir Thomas Farrer asked the following among other questions of the Chairman of the Committee, viz.:

- 1. Whether the amount of the lowest tender for these buildings was 11,386£, and whether the amount of the next lowest tender was 14,168£?
- 2. What was the amount of the Architect's estimate?
- 3. Why did not the Committee recommend the acceptance of the lowest tender?
- 4. Whether the Committee had considered how the work could be superintended if it were undertaken by the Council itself?

To these questions Mr. Grosvenor replied as follows:—1. Yes. 2. £10,800. 3. Because the Committee had reason to apprehend that the tender would be withdrawn, and it had, in fact, since been withdrawn. 4. The Committee had not considered the question of arranging for superintendence; it would be time enough to do that when the Council had decided that it would do the work itself.

The further consideration of this matter was postponed, for want of time.

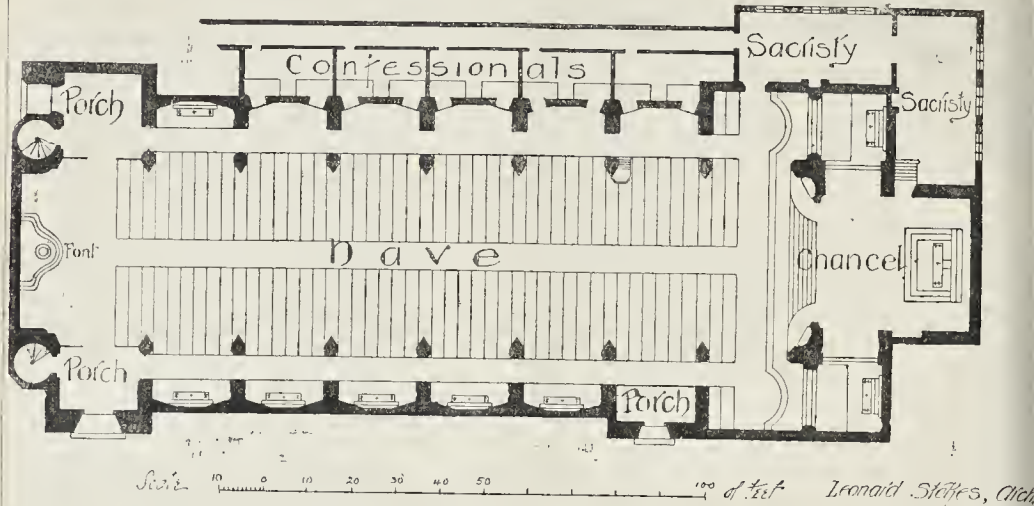
Woolwich Ferry: Northern Approach.—The same Committee also reported as to the necessity of improving the northern approach to the Woolwich Ferry, at an estimated cost of 31,500£, but the consideration of this, too, was postponed.

After discussing other matters the Council adjourned at twenty minutes past seven.

BOARD SCHOOL, LEEDS.—On the 28th ult. a new Board School, situated in the Queen's-road, Leeds, was opened. The building is on the central hall plan, and is approached by two entrances from Royal Park-road, one for boys and another for girls and infants. Egress is obtained for the boys by the staircase to the covered playgrounds, which are under and at the lower end of the building, advantage being taken of the fall of the land for this purpose. Cloak-rooms are provided, as well as teachers' rooms. The central halls each measure 77 ft. 8 in. rooms. The class-rooms are 18 ft. high, and are planned to hold sixty scholars each, with the exception of the wing class-rooms, which provide accommodation for seventy-two each. The total accommodation of the school, inclusive of the central hall, is for 1,236 scholars. The building is built of brick with stone dressings, and is in the Italian style. The school has been designed by Mr. William Landless, architect, who has superintended the carrying out of the work.

* For list of these tenders see *Builder*, Oct. 1, p. 271.

NEW CHURCH MILES PLATTING



Illustrations.

WINDOW, RYDAL CHURCH.

THIS design for this window, by Mr. H. Holiday, was one of the most noteworthy pieces of decorative design in the Architectural Room of the Royal Academy this year. The subject is that of glorified childhood, the keynote of the design being the text, "In heaven their angels do always behold the face of my Father which is in heaven." The window is in memory of Miss Jemima Quillinan, granddaughter of Wordsworth, who was a loving friend of children, and is erected by a number of those who had experienced her kindness. The window was to have been placed over Wordsworth's pew in Rydal Church, but owing to the presence of rocks and bushes which obscured the light on that side of the church, it has been fixed on the opposite side.

The colour, which we cannot unfortunately show, is rich and warm in tone, and the decorative effect of the composition thoroughly satisfying to the eye.

NEW CHURCH, MILES PLATTING, MANCHESTER.

This church, which the Norbertine Canons are about to build in the poor and populous district of Manchester known as Miles Platting, is designed to accommodate about 1,200 worshippers, and is so planned that the greater number of these can see the high altar. The work has not yet been begun on account of lack of funds, but it is proposed to build the church almost entirely of the local bricks, stone, however, being used for the nave piers, arches, vaulting ribs, &c. As the church is to be specially dedicated to the Blessed Sacrament, any richness in the design has been massed round the high altar, the nave depending upon its size and simple dignity for effect. The drawing we reproduce was exhibited this year at the Royal Academy, and is from the hand of the architect, Mr. Leonard Stokes. To the fine and original quality of the design we draw attention in our criticism on "Architecture at the Royal Academy."

NEW TRAVELLERS' CLUB, PICCADILLY.

This building, which has been recently erected for Sir Henry Brownrigg, Bart., from the designs of Messrs. Thomas & Frank Verity, is situated at the corner of Piccadilly and White Horse-street.

On the ground floor there are spacious morning, smoking, and dining-rooms. On the first-floor, approached by a marble staircase, are the reading, writing, and card-rooms, private dining-

rooms, and the billiard-room. The secretary's rooms, and bedrooms for the convenience of members, are placed on the upper floors, access to which is gained by a passenger-lift.

In the two basements there are ample lavatories and retiring-rooms for the members and staff, where are also the kitchens and other offices, and the holler-rooms. The front is executed in Ham Hill stone, and the building is entirely of fireproof construction, by Messrs. Dennett & Ingle.

The warming and ventilation was carried out by the late Mr. W. W. Phipson, and the sanitary work by Messrs. J. Bolding & Son, the general contractors being Messrs. Alfred Bush & Sons, of Ridgmount-street, W.C.

The drawing was exhibited in this year's Royal Academy Exhibition.

CATHEDRAL COURT, ROTTEN-ROW, GLASGOW.

This is an experimental block of model dwellings for the working classes erected from the designs and under the supervision of Mr.

occupy a site in the older portion of the town, near the Cathedral, forming part of "Bell o the Brae" (highest part of the hill), where, in a sanguinary skirmish about 1300, Sir William Wallace is said to have expelled the English garrison from the town. The site is oblong in form, having a frontage to Rotten-row on the north and overlooking High-street on the south, and has an area of 1,105 square yards or thereabouts. The ground, along with the picturesque old "corbie-stepped" gabled buildings thereon was acquired by the company in the open market for less than 20s. per square yard.

The new buildings form two blocks, one towards Rotten-row, and the other overlooking High-street, with an enclosed courtyard between about 60 ft. in width, open to the west. Entrance to both blocks is obtained from Rotten-row.

The north block fronting Rotten-row is five stories, and the south block towards High-street six stories, in height; the two lower floors of the latter are leased to the University Settlement Association, and are to be called "Toynhee House" after Toynhee Hall in London.

They consist, on the lower floor, of a large hall measuring about 38 ft. by 18 ft., a drawing-room about 27 ft. by 18 ft., a kitchen, and a small library. In the drawing-room, evening parties will be given of a perfectly simple kind, where hosts and guests meet on the footing of friends. The hall, which will accommodate over 250 people, will be used probably twice a week as a gymnasium, and on other nights for the meetings of the literary society, the singing class, and for lectures, and occasionally for smoking concerts. On the upper flat are the men's club-room, with class-room attached, and the girls' club and class-rooms. The men's club meets every night. The girls' club will probably meet three times a week, and on the other nights there will be sewing and other classes. An internal staircase connects the upper and lower floors. These rooms are so planned as to be convertible into dwelling-houses if required.

The remainder of the south block and the whole of the north block are devoted to dwelling-houses, fifty-seven in all; consisting of seventeen of one room, and forty of two rooms, with a house of three rooms for the caretaker. The one-roomed houses vary in size from 15 ft. by 10 ft., to 22 ft. by 10 ft.; while the two-

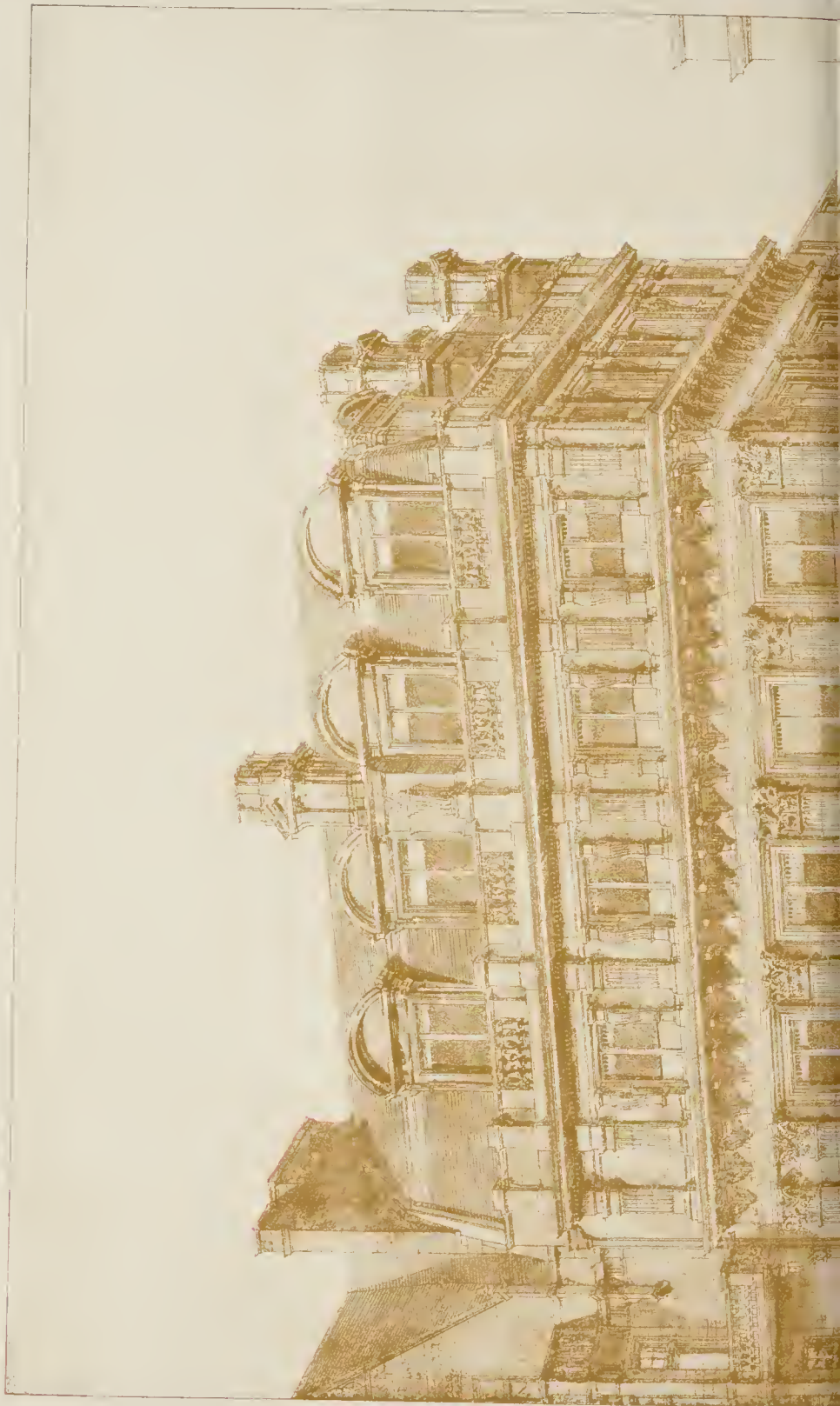


Old Buildings Formerly on the Site of Cathedral Court.

John James Burnet, of Messrs. John Burnet, Son, & Campbell, architects, by "The Glasgow Workmen's Dwellings, Company, Limited," at a total cost of about 8,000. The buildings



THE BUILDER, OCTOBER 15, 1892





THE BUILDING, MODELS OF A.S. & CO. HARDING STREET LONDON E.C.

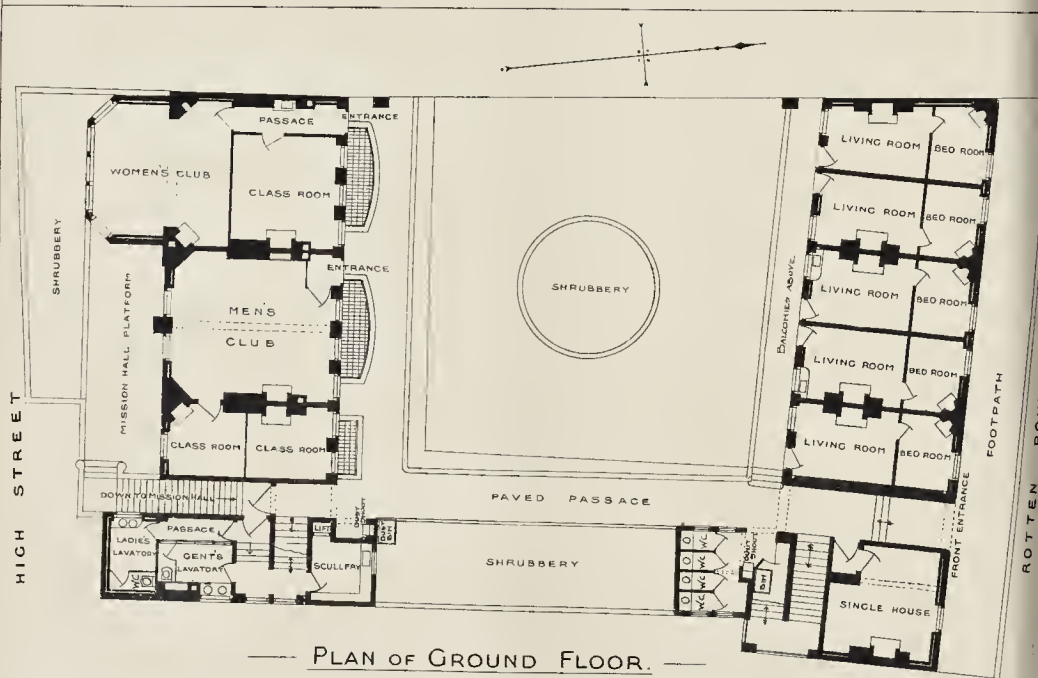
NEW TRAVELLERS' CLUB, PICCADILLY MESSRS T & F VERTIS ARCHITECTS

Royal Academy Exhibition. 1892





ELEVATION TO COURT



PLAN OF GROUND FLOOR.

PHOTO-LITHO, SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER, LANE

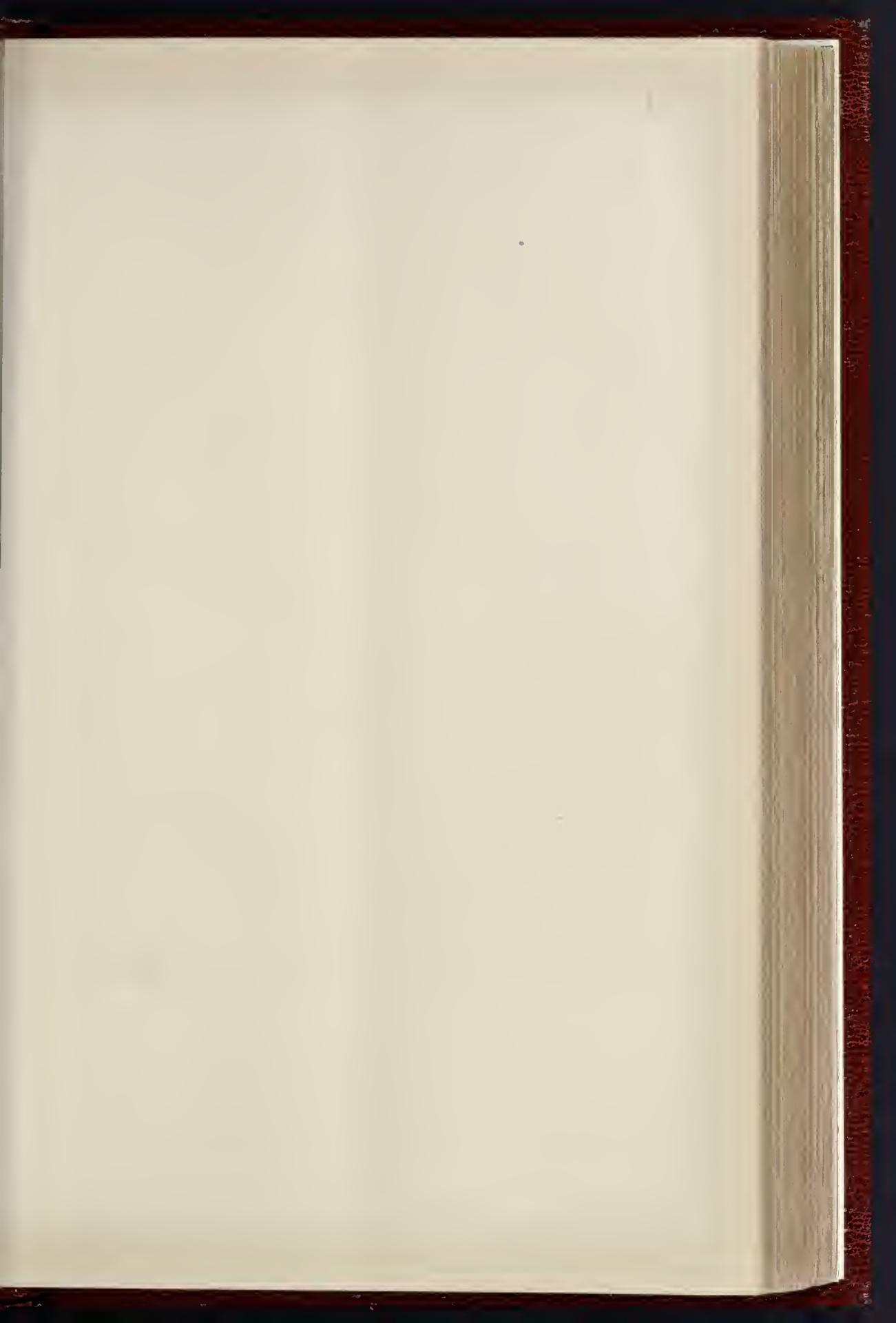


VIEW FROM HIGH STREET
PHOTO-LITHO. BRAGUE 3 OF 4 & 5 EAST HARDING STREET FETTER, LANE E.C.

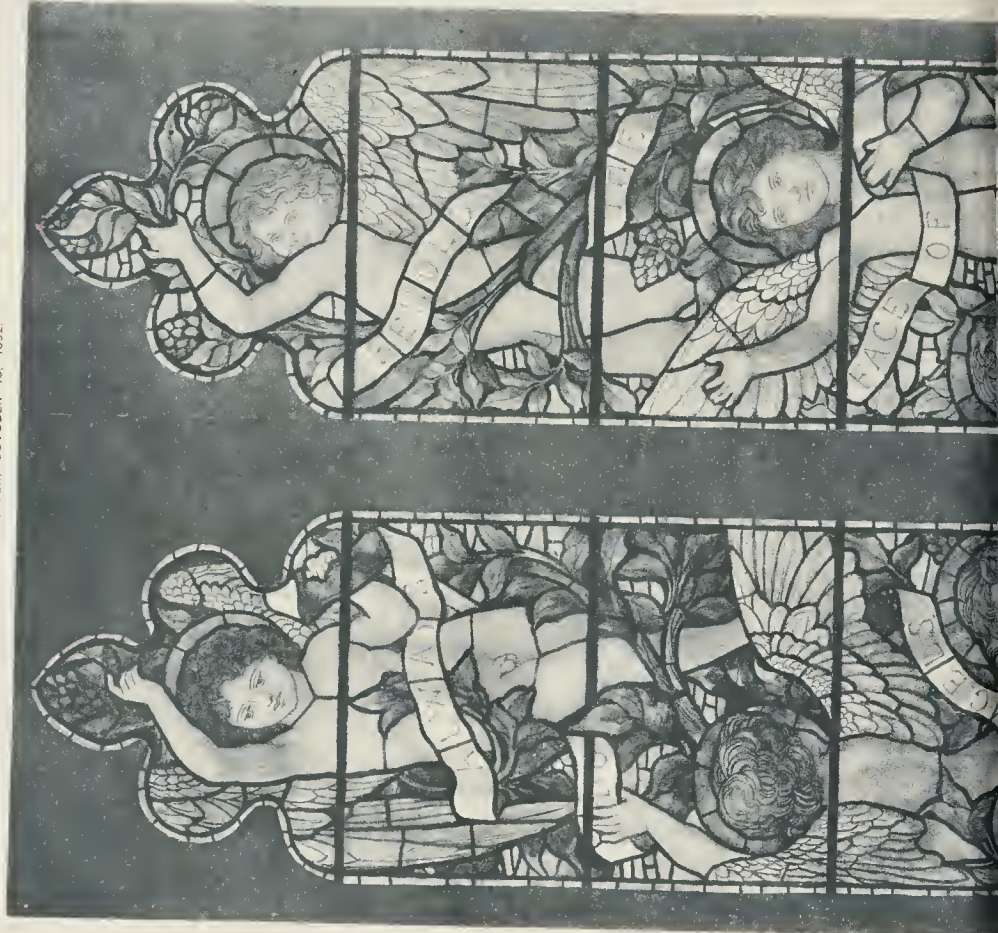
"CATHEDRAL COURT," GLASGOW.—MESSRS. BURNET, SON, & CAMPBELL, ARCHITECTS.



VIEW FROM ROTTEN ROW



THE BUILDER, OCTOBER 15, 1892.

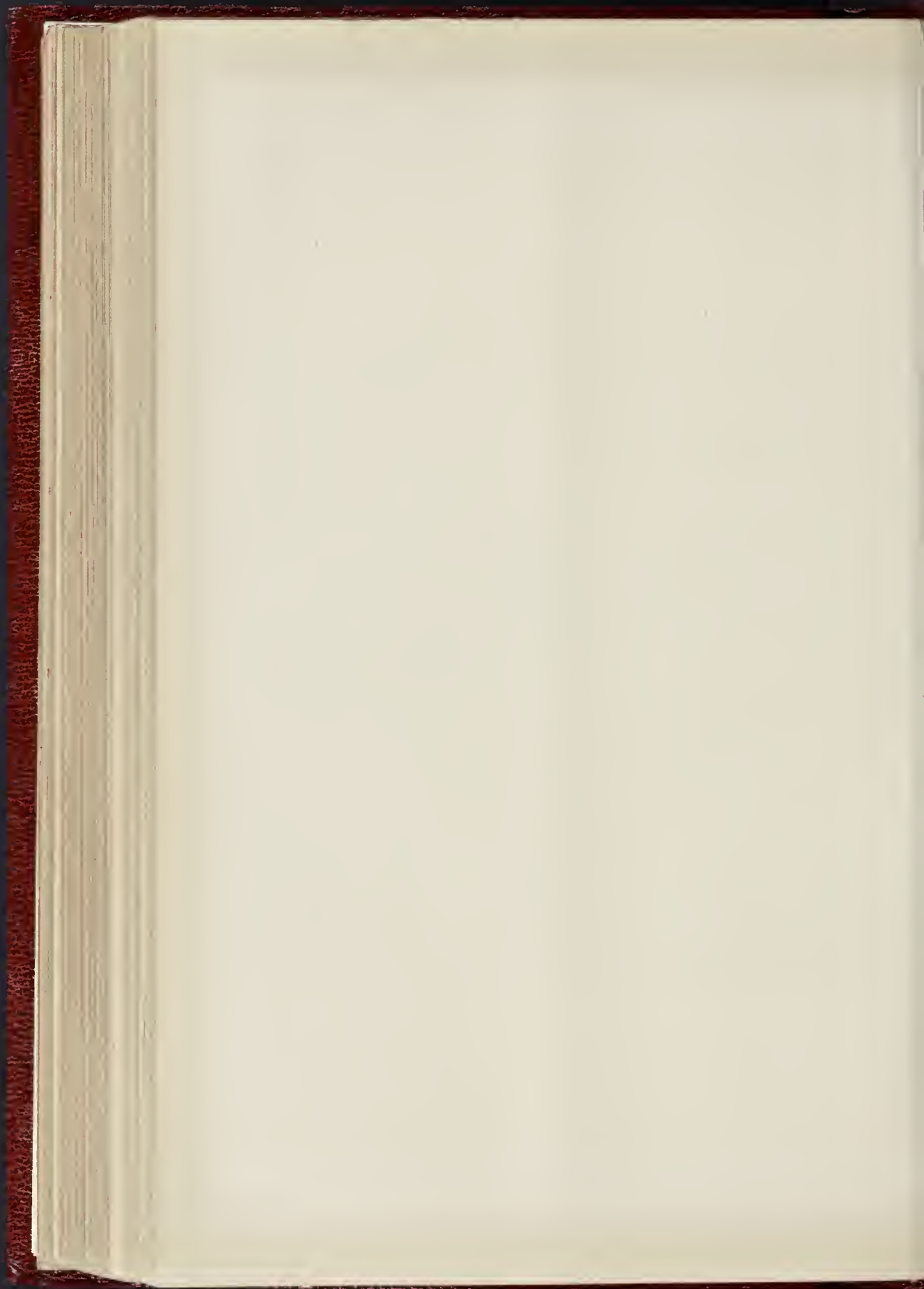




THE PHOTO BRASCOLE & CO. 48, 5 EAST WINDING STREET, LONDON, E.C.

DESIGN FOR A STAINED GLASS WINDOW FOR RYDAL CHURCH—BY MR. HENRY HOLIDAY.

Royal Academy Exhibition, 1899.



room houses consist of a living-room 14 ft. by 10 ft., and a small bed-room 10 ft. by 7 ft. 6 in. All the rooms are 9 ft. in height. The cubic capacity of the two-room houses is 1,800 cubic ft., which, at 400 cubic feet per adult (the limit under the Glasgow Police Act), suffices for a family of say a man and his wife and three children under ten years of age. The larger one-roomed houses are on the top floor of each block, and are of the same size as the two-roomed houses below, the partition having been removed as an experiment. The cubic capacity of the smaller single rooms is 1,200 cubic feet. There is through ventilation from front to back of each house.

The east end of each block gives access to the upper floors, and balconies therefrom, facing the court, give access to the houses. The washing-houses and drying-ground are situated on the flat roofs.

Water and gas are laid on to each house, and each has kitchen range, bed-room grate, and iron bed-frame. Where desired by the tenant, automatic gas-meters have been introduced. Water-closet accommodation, one for every two houses, is provided on each flat, in a part of the building disconnected from the dwelling-houses. A ventilated dust-shaft from each flat communicates with an ash-bin on the street level. The sanitary appliances are described as of the latest type, ventilation pipes and traps thoroughly airing the system in the most approved manner.

The rents are meantime fixed upon a low scale, ranging from 1s. 7d. to 2s. 3d. per week for one room, and 2s. 5d. per week for two rooms. This rent includes water supply and cost of stair gas, but no taxes. There is a resident caretaker.

The buildings are constructed with hollow brick walls, rough-cast on the outer surface, the dressings, steps, and balconies being of red concrete. The walls next the street, and on the balconies, where the rough-cast might easily be removed, are covered with polished red cement. The floors (with exception of the flat roof, which is of iron and concrete, finished with Limmer asphalt) are of wood. Internally the walls are plastered on the bricks, without lath or straps.

While great care has been taken to construct economically, every attention has been given to securing solidity and strength, and though practically without ornament or moldings, and planned with the main object of affording human habitations at the lowest possible cost, the buildings, as will be seen, are not without effect, arising from the grouping of the windows and arrangement of the general masses of building, and the whole represents a successful effort to obtain some picturesque effect in an essentially utilitarian structure.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

WE now resume and conclude our report* of the recent meeting at Belfast of the Incorporated Association of Municipal and County Engineers.

Sanitary and Engineering Progress in Londonderry.

Mr. W. J. Robinson, Assoc. M. Inst. C.E., City Surveyor of Londonderry, read a paper on "Londonderry, with some notes on its Engineering and Sanitary Progress." After a historical review of the city, Mr. Robinson continued as follows:—

Water Supply.—At the time of the siege the city was supplied with water from about 100 wells. The first public water supply was obtained by the construction of a small reservoir on the hill above Waterside, on the south-east side of the city; this was constructed to hold 4,000,000 gallons; the water was conveyed from this reservoir into the city, a distance of over a mile, by means of oak pipes, having 6-in. bore; some of them are still in use. The estimated cost of these works was 8,000*l.*, but, through mismanagement in conducting them, the actual cost was 15,533*l.* 8s. 9d. The entire ground taken up by this reservoir was only 1 acre and 27 perches.

In 1852 a scheme was put forward for constructing works on the north-west side of the city; a reservoir was made capable of holding 10,000,000 gallons, and which at that time was considered of great magnitude, but the facility

of stopping at a half measure was discovered before the works were completed and additional powers were obtained to construct a second reservoir in the same valley capable of holding 70,000,000 gallons, the quantity sent into the city daily being about 300,000 gallons. This was the full capacity and supply up till 1878, when it became evident it was quite inadequate; as a temporary measure, the banks of the reservoirs were raised so as to increase the capacity about 10,000,000 gallons; however, the peace obtained from those who clamoured for more water was short lived. Agitation was set on foot, various schemes were suggested; the Corporation took the opinion of some eminent engineers, but eventually fixed upon a plan put forward by the author, which was examined, approved, and reported upon by Mr. L. L. Macasey, C.E., of Belfast, by whose advice, as Consulting Engineer, the works were constructed. These include three reservoirs on the north-west side of the city, capable of holding 150,000,000 gallons, and on the south-west side two reservoirs, capacity 40,000,000 gallons. At present there is a supply of 30 gallons per head per day, and by a small outlay, the intake of water to these reservoirs can be donly augmented. Previous to 1887 there had been no provision for filtration of the water. Connected with the works then in operation, and which affected the lower levels of the city, there was constructed a large straining well, fitted with double copper wire screens, and crushed cinders placed between the screens; the percolation of the water through these has rendered it much brighter and most effectual in lessening the aluminoid ammonia. The upper, or higher part of the city, which was supplied from a different service, has been provided with a filter-bed formed of cinders, sand, and gravel. A part of the district thus supplied stands higher than the filter-beds, but the difficulty thus presented has been obviated by creating a pressure of 50 ft. by means of a pair of pumps driven by a direct-acting motor, which is in turn actuated by the inflow of the water to the filter-bed; this motor is of the "Duncan" meter pattern. It has now been in operation two years, and has been found to work well. The amount expended in waterworks during the past seven years has been upwards of 35,000*l.*; the water is analysed each quarter by the city analyst, and generally is reported by him to be very satisfactory.

Streets and Roads.—Until the year 1874 the streets were repaired with a very inferior quality of road-metal obtained in the locality; this road-metal, under heavy traffic in wet weather, soon became sludge, and of course in dry weather it produced volumes of dust. Search was made at every likely place for good road-metal. A quarry was found 3 miles north of Buncrana, being 16 miles from the city. The cost of carriage added materially to the price, but one of Marsden's steam stonebreakers was obtained, as also one of Aveling & Porter's steam-rollers, and it was found that the higher-priced road metal, with properly made streets, in addition to the superiority of the road, was in the long run much the cheaper. Here it may be stated that, although the author has had the steam-roller working in the city for seventeen years, there has never, through its operations, been an accident, nor a single claim put forward for an alleged accident. At present there are forty-two miles of streets repaired by the Corporation. Within the past two years, however, attention has been directed to the substituting paved sets for macadam in the streets where there is heavy traffic, and at present a good deal of this work is being carried out with Welsb and Rostrevor sets laid on concrete beds and grouted with cement.

Footpaths.—Previous to 1874 but very few parts of the footpaths of the city were flagged, they being chiefly formed of an inferior kind of slatstone for kerbing and gravel surface. Since then most of the city has had proper footpaths made. All the kerbing and crossings are obtained from Armlalong. A loan has been sanctioned by the Local Government Board, which provides for completing all the pavement of footpaths in the city. For several years any flagging used was obtained from Calthness, Yorkshire, Kilrush, or Manorhamilton; it was found that none of these could be laid for less than from 7s. to 8s. per super yard. In 1886 the attention of the author was first directed to the laying of Stuart's granolithic. After having examined and seen its use in several Scotch towns, its adoption was

recommended, and a contract was entered into with Messrs. Stuart for laying several thousand yards at 3s. 10d. per square yard. Two years ago the plan was considered of laying footpaths somewhat after the same description as the granolithic, and which promised to be done much cheaper. There is at Lifford a very superior gravel which is delivered cheaply in Derry; it was found that by thoroughly washing and sizing it a very excellent material was obtained, equal, if not superior, to the ground granite used by the Messrs. Stuart. This gravel with equal proportions of cement forms the top 1½ in. thick, laid on concrete 4 in. thick, having under it a bed of roughly broken stones. It is found that this class of footpath can be laid for from 2s. 8d. to 3s. per super yard.

Sewerage.—Previous to 1848 no attempt whatever was made to have anything like a system of sewerage. Where there were any house-drains at all, they emptied into what have been called "elongated cesspools" in the streets. In that year an Improvement Act was obtained, under which some of the streets were sewered, the larger ones with "brick egg-shaped" sewers, and the smaller ones with circular stoneware pipes; in these works, however, no thought of ventilation ever entered the mind, nor indeed was such contemplated or attempted. Previous to the year 1876 such a thing as the separation system was not to be found. All baths and basins were connected with the water-closet pipes and served, according to the then plumbing knowledge, to flush the drains. In 1876 a Provisional Order was obtained for sewerage all the streets of the city which had not been previously sewered.

In 1887 the author was called upon by the Corporation to fully report upon the sewer system. In order to do this, the four following questions were prepared, and replies received from sixty-eight towns in England, eleven in Scotland, and twelve in Ireland:—

1. Is there a regular system of ventilation of the public sewers in your town?
2. Are the sewers ventilated by means of openings on the streets? If so, what distance apart are they; and have there been complaints from the public in consequence of annoyance or inconvenience arising from the effluvia from them?
3. Are any of the sewers ventilated by means of chimney shafts carried beyond the roofs of houses? If so, are they erected against private houses, or are they separate sewer shafts for sewer gas alone?
4. Please give any further additions which may be in use in your municipality for sewer ventilation.

Of the answers received from England forty-six had a regular system of ventilation, twenty-two had not. Of the Scotch towns, six had a regular system, five had not. Of the Irish towns, three had a regular system, two partially so, and seven had not. Having this information, and after giving the matter the best consideration, it was decided to recommend a regular system of street ventilation, together with eight column ventilators carried up to the tops of the chief buildings connected with the Corporation property. A few of the street ventilators are "Latham's Patent Spiral," the most of the others were obtained from the Glenfield Company, and are fitted up for charcoal. It having been decided to carry out the work by expenditure out of revenue, and not borrow for it, we had to lay a number each year, and consequently the city has not yet been completed, but so far as it has gone there have been the best results; in no instance has there been reasonable complaint through the escape of sewer gases.

Connected with by-laws for the building of houses, made by the Corporation in 1887, it is imperative that every person constructing a house-drain receiving sewage from a water-closet shall erect a ventilating pipe, at least 4 in. in diameter, and closely jointed, of cast-iron, carried up to the ridge level of the roof of the building, and fitted with proper wind-guard.

The sewage empties into the river Foyle, the tide of which rises from 7 ft. to 9 ft. All the outlets have tide-flaps of the best kind.

Lighting.—The lighting of the city with gas was started in 1830, and has been a very great success to the shareholders. What is called the full rating of property, that is, 4s. in the pound, depends upon being within a radius of 100 yards from a public lamp; all property outside this

* See Builder, p 281, ante.

distance is only charged one-third rate, or 1s. 4d. in the pound. In a number of the leading streets Sigg's patent lamps have been erected, each one of these costing as much as five ordinary lamps. The present cost of ordinary lamps is 3s. 5s. per annum, and the charge for gas 3s. 10d. per thousand feet. Last year the Corporation obtained a provisional order to light the city with electricity, which at present is in course of being carried out.

The sanitary department is looked after by the Public Health Committee, which includes all the members of the Corporation. The City for several years has been singularly free from epidemic, and the death-rate, as published by the Registrar-General, contrasts most favourably with the other sixteen towns with which it is associated in Ireland. For the past ten years the average annual death-rate for Ireland has been 25.2 per thousand of the population, while that for Londonderry has been 22.2.

The increasing population has been comparatively satisfactory, more especially when it is considered our country's population has been retrograding.

The population of Londonderry in 1841 was 14,087, in 1851, 19,888, in 1861, 20,875, in 1871 25,242, in 1881, 29,163, in 1891, 33,200.

General.—Within the past five years the Corporation has provided the city with a Guildhall at a cost of over 16,000*l.*, a School of Art, which is spoken of as inferior to very few, a fire-brigade station, fairly well equipped, and last year an order was given to ornament the principal streets with trees, which has been done, and gives promise of being successful.

Mr. T. de Courcy Meade (Hornsey) proposed a vote of thanks to Mr. Robinson for his paper. He thought the town of Londonderry was to be congratulated on being one of the first in Ireland in which there was a proper system of sewer and street ventilators. He would like to ask Mr. Robinson whether he found the charcoal in Latham's ventilators to be of any use; or whether, in this humid climate,—he spoke from experience in London,—it was not absolutely useless in two or three days. He had taken the charcoal out of hundreds of them, and would be very pleased to sell at a price the cages in which the charcoal was held.

Mr. J. T. Eays (West Bromwich), who seconded the vote of thanks, having congratulated Londonderry on its good sanitary work, said he quite agreed with Mr. Meade as to the inefficiency of charcoal ventilators. He thought the idea of putting them in had been exploded years ago; for he did not know a town in England where they were believed in at the present time. The only other point which struck him as peculiar was the cleansing of privies at the expense of the occupier. The modern practice was for the authorities to undertake all the cleansing themselves at the expense of the public rates. He thought the system of compelling owners of property to empty their own privies was not to be commended at all. No doubt it was done much more efficiently by the local authority, and should form an expense upon the general rates of the district.

Mr. Spencer (Newcastle-on-Tyne) thought the rating was carried on in a peculiar manner. He agreed with the former speakers as to the ventilation of sewers, and said the chief use of charcoal as a ventilator appeared to be to absolutely prevent ventilation.

Mr. Cowan, County Surveyor of Down, said he had had considerable experience with the ventilation of sewers in small towns where there was inefficient flushing, and he considered that most of the nuisance which arose from street ventilation was due to bad sewers, which often delivered sewage in a state of putrefaction. He thought the remedy lay in treating the whole system of drains and sewers as one, so as to ensure a rapid delivery of all waste matters from inlet to outlet.

The vote of thanks having been accorded, Mr. Robinson, in reply, admitted that nothing had given him more anxiety than this question of ventilation. He confessed there was a great deal of difficulty in keeping the charcoal so charged that it was beneficial. He might say that a rate of 4s. covered everything, and property 10*s.* yards from a public lamp only paid 1s. 3d. to the Corporation.

Mr. Stnbs (Darwen) moved a vote of thanks to the Lord Mayor and Corporation for the use of the Council Chamber, which was seconded by Mr. Stead, of Harrogate, and adopted.

The President next moved a vote of thanks to Mr. Macassey, Water Engineer, for showing the members over the Waterworks.

Mr. A. M. Fowler (Manchester), in seconding, commented upon the claim of the Polarite Company to pass a thousand gallons of sewage per square yard through their filtering medium in twenty-four hours, while Belfast could only pass 500 gallons of comparatively clear water.

The vote of thanks having been accorded, Mr. Macassey, in acknowledging, said his experience was that with quick filtration, when it reached a thousand gallons per square yard in twenty-four hours, the effluent was not good, and the result was unsatisfactory.

The members then visited the Queen's Bridge, Albert Bridge, and Main Drainage Works (all of which are fully described in Mr. Bretland's paper). At the Main Drainage Works the members were entertained to luncheon in a marquee erected in one of the partially-constructed tanks, Mr. Martin, the contractor, presiding. In addition to the loyal toasts, the toasts of the Lord-Lieutenant and Prosperity to Ireland, the City and Trade of Belfast, the Association of Municipal and County Engineers, compiled with the name of the President and that of the Chairman, were duly honoured. The party then proceeded to Ballynemoch House, county Down, where they were received by the Lord Mayor and Lady Dixon.

Correspondence.

To the Editor of THE BUILDER.

PARTNERSHIP IN ART.

SIR,—In your notice of the art-work exhibits at the Church Congress meeting at Folkestone, you condemn handsomely the pernicious system of authorship in such work when represented by co-partnerships.

May I ask what you have to say in respect of precisely the like system operating in the practice of architecture? I need hardly remind you of the partnership concerns, past and present, of Scott and Moffat, Banks and Barry, Bodley and Garner, Pritchard and Seddon, Wyatt and Brandon, George and Peto, Arthur and Raphael Brandon, Shaw and Nesfield, Deane and Woodward, Paley and Austin, Francis Bros., Blomfield (Sir Arthur) and Sons, Carpenter and Ingelow, Somers Clarke and Micklethwaite, Johnson and Dobson, &c., &c.

The list may be extended *ad infinitum* by reference to the London and County Postal directories.

AN ARTIST.

* * * Our correspondent (who is an artist in stained glass) is mistaken if he supposes that the point he makes was out of our mind in writing. But the cases are not exactly parallel. Architecture is a science as well as an art, and in some classes of buildings the science is the more important element of the two, and two heads may be better than one in such cases. What we draw attention to in the case of stained glass is, that the design of a stained-glass window is a piece of individual artistic design and drawing, just in the same sense as a picture, and must be the work of one man. The making and leading-up of the glass is manufacture, no and leading-up of the glass is manufacture, no doubt, but the design is a matter of pure art. We have frequently, in publishing a stained-glass design under the name of a firm, requested the name of the actual designer; in some cases it is readily given, in some cases there is great reluctance and grumbling about being asked to give it, and in the latter case (if we get it) it generally turns out that the real designer is an artist in the employ of the firm, whose name does not appear, so that the nominal artists are merely manufacturers and dealers. In the case of a partnership architectural design we think it far preferable that the personal responsibility for the design should be stated, and we believe there is a growing feeling among architects in favour of this. But even admitting that, the designing and supervision of a building is not necessarily so direct and personal a piece of artistic production as the drawing of a cartoon for a window.—ED.

WANTED.—A FIFTEENTH-CENTURY SCULPTOR.

SIR,—I have recently acquired a fifteenth-century carved wooden statuette (17 in. high) of the Madonna and Child, of which parts of the drapery and the hands want restoring; and I do not know who can do it. I cannot remember to have seen any modern figure sculpture resembling the old. Modern work, it seems to me, either embodies the grossness of the Renaissance style, or, if it does claim to be what is called devotional, it is a paltry version in relief of the paintings of the insipid Dusseldorf school. If any of your readers can tell me of a sculptor in wood who could be trusted to carry out the work in such a way as to preserve the pronounced features of fifteenth-century mannerism, I shall be very grateful to hear, either by letter direct to myself at my address or

through the medium of your correspondent's columns. The latter course would, I venture to suggest, be the better, for there may be others beside myself to whom the information would be welcome. I should require to see specimens of work of anyone recommended to me, to enable me to satisfy myself before giving the order.

AYMER VALLANCE,
21, Upper George-street, Bryanston-square, W.
* * * If our correspondent wishes the missing portions restored so as to look like fifteenth-century work, it would imply that *no one* can do it, because a nineteenth-century hand and are not fifteenth-century brain and hand.—ED.

IS THE PROFESSIONAL ASSESSOR A FAILURE?

SIR.—Some time ago the Town Council of the Borough of Accrington advertised for designs for a technical school.

The conditions stated that the Committee would call in the assistance of a competent assessor, Fellow of the R.I.B.A., along with a Professor of Technical Instruction, to assist in selecting the design.

Under this semblance of fair play, architect from a distance, who might not otherwise have done so, entered the competition, the result being that the award of the two assessors, Mr. J. Murgatroyd, F.R.I.B.A., and Mr. J. H. Reynolds, Director of the Municipal Technical School at Manchester, placed our designs first, and those of local architect second.

One of the conditions was that the cost was to be 6,000*l.*, but another condition was that the accommodation should be as per a schedule given. The assessors stated in their report that the above sum was altogether inadequate, and that in their opinion it was not possible to arrange any plan to contain the accommodation required for this sum.

After receiving a notification that we had been awarded the first premium, and asking us to give an estimate of the cost of our design (which we had not previously done) we waited some three weeks before hearing nothing we wrote to the Town Clerk and in reply received a letter informing us "that the Council, in consequence of the estimates for carrying out any of the premiated designs being far in excess of what they contemplated, had decided not to carry out any of the schemes, but have instructed Mr. H. Ross, of this town, the winner of the second premium, to prepare new plans for their consideration," thus completely ignoring the assessors' decision.

That the Committee are sheltered from any legal liability by a saving clause in the Conditions, which we need not quote, is no excuse for their action in the matter. We may remark in passing that we sent for our drawings immediately after receiving the Town Clerk's letter, and were not surprised to find pin-holes in the four corners of each drawing.

The moral of this case seems to be that before a professional assessor accepts an appointment he should have some guarantee (in the interests of the profession) that the architect whom he selects for the first place should be engaged to carry out the work, if considered by him competent to do so; otherwise we are bound to think the object in having an assessor is entirely defeated, since architects do not compete for work for the sake of getting the first premium, but with the reasonable expectation of having the work to do.

MORLEY & WOODHOUSE.

Braeford, October 10, 1892.

* * * Our correspondents have no doubt been shabbily treated, especially if the inference from the "pinholes" is to be accepted; but we must point out on the other hand (as we have done before) that it is out of the question to expect that the people who are going to pay for and use a building will bind themselves absolutely to accept another person's choice. The custom of appointing a professional assessor is not therefore useless; where committees are sensible people who mean fairly, they will in the majority of cases accept the assessor's judgment, conscious that they are probably doing best for their own interests in doing so. If they are not wise and do not mean fairly they will not accept it, and in that case it cannot be helped. If the architectural profession attempt to have it ruled that committees are to bind themselves absolutely to accept the assessor's finding, they will soon make an end of the assessor, and lose the undoubted benefit of his influence in the majority of cases.—ED.

GAS-LIME.

SIR,—I believe gas-lime on exposure to the air turns white, absorbing oxygen, and being finally a mixture of sulphate of lime and carbonate of lime. Are these two things always in a tolerably definite proportion, or are they very variable? About how long does gas lime generally require to be exposed before the change is brought about?

W. F. C.

* * * In reply to our correspondent's inquiry, gas-lime undergoes the changes indicated on ex-

posure to air. The proportions, however, of the two constituents are very variable, much depending upon details of the manufacture and mode of purification of the coal-gas, and even upon the variety of coal used, as well as, of course, upon the physical condition and variety of lime employed, and whether only thin layers are exposed to air protected from the weather, or whether large heaps which the influence of the air can only slowly penetrate are to be dealt with.

The waste lime from a particular works might be reasonably uniform in composition, but would probably differ considerably from the product of another works. The following has been given as a typical analysis of a sample of fresh gas-lime:—

Calcium Hydrate (slaked lime) ...	32.60
Calcium Carbonate ...	17.50
Calcium Sulphate and Sulphate ...	29.20
Calcium Sulphide and Thiocyanate ...	traces
Ammonia ...	0.01
Water ...	30.10
	100.41

The time taken to convert all the lime into carbonate and sulphate must obviously depend upon the original composition of the gas-lime, and the conditions under which it was exposed to the air (whether in thin layers or in large heaps). Direct experiment would be the only satisfactory method of settling the point.

In some works Brier's oxygen method of purifying coal-gas is adopted. Oxygen is added to the coal-gas before it is passed through the lime, with the result that the sulphur compounds and carbonic acid combine with the lime with separation of a considerable quantity of free sulphur. In many works much of the sulphur is removed by means of oxide of iron, and in others, again, lime alone is employed.—Ed.

The Student's Column.

CONCRETE.—XVI.

AGGREGATES (continued).

THE great variety of limestones precludes a detailed description of them. The remarks about the strength, weight, and porosity of sandstones are applicable to limestones. Kentish Rag is a dense, hard, and durable stone, and is often used in concrete for foundations, &c.; Portland stone, and some of the harder varieties of Bath stone, yield excellent aggregates; chalk has also been used for common work, but it cannot be recommended, as it requires careful manipulation and does not attain to the strength which good concrete ought to possess. Marbles also will prove suitable for aggregates, and, in fact, any material of sufficient strength and durability, and to which the cement will adhere, may be used. Many of the harder varieties of limestones and marbles are used for the face-concrete or finishing-surfaces of paving, curbs, &c., in the same way as crushed granite, and, although they are not equal to the latter in durability, they furnish an extremely hard surface, capable of taking considerable polish. As we have already stated, limestone is easily affected by fire; sometimes the limestone facing of buildings has been entirely burnt away, while the brick backing has remained standing.

Slates.—Broken slates, the refuse of slate quarries, may also be used in concrete, but they are too dense and laminar to make really good work.

Broken brick, &c.—Broken bricks of various kinds, roofing tiles, retorts, and pottery furnish extremely useful aggregates. They have, in the process of manufacture, been subjected to great heat, and are therefore less liable to change of form under the influence of fire; for this reason they are especially valuable for the concrete of floors, &c., which are intended to be fire-resisting. Broken fire-bricks have been especially recommended for this purpose, but some of them have not much strength. Many kinds of bricks, too, are lighter than some kinds of stone, and this is worthy of consideration in floors, but the crushing strength of the latter will, as a rule, be greater than that of the bricks. The porosity of most bricks is a point in their favour, as this facilitates the adhesion of the cement to their surfaces, but care must be taken that the bricks are soaked with water before they are made into concrete. Experiments have shown that dry, soft place bricks, joined with lime mortar, can be separated with only one-half the force that is required to separate hard-grey stocks similarly united; the figures being 18 lbs. and 36 lbs. per square inch respectively at the end of one month. Old brickwork and tiles from buildings, pottery,

refuse, &c., usually require thorough washing before they are fit for use.

Some experiments on concrete arches carried out by Mr. C. Colson, showed that the arches composed of Portland cement, sand, and broken bricks were more than 50 per cent. stronger than similar arches of Portland cement, sand, and screened harbour shingle, the proportions in all cases being the same, namely, 1, 3, and 6. The superior strength was "evidently due to the more absorbent and angular character" of the bricks. "The appearance of the fractures in the two cases, i.e., shingle and broken brick, showed a marked difference. In the first case, the strain destroyed the adhesive power existing between the shingle and the matrix; in no instance was a stone observed to be fractured, the casts being, as a rule, clearly defined in the cement. In the second case, the superior adhesive power existing between the broken brick and cement matrix was manifest; in but few instances had the cement left the surfaces of the brick, the general character being that of complete disintegration of both brick and matrix."

Bricks ought not to be used as an aggregate in works exposed to the sea, as they have been found to disintegrate under such conditions.

Burnt Clay, &c.—Closely akin to broken brick is burnt clay. This is frequently recommended as a good aggregate, and so it is when the burning is thoroughly carried out. But it is just this thorough and equal burning of the clay which is so difficult of attainment, especially in contract work. As a rule, some other aggregate can be obtained, which will be of more uniform quality; underburnt clay will make wretched concrete. Shale, which may be described as a laminated clay or mud, is sometimes burnt and used for concrete in the same way as clay. The material is usually burnt over a fire of wood and coal or coke, fresh supplies of clay or shale and combustible material being added alternately as the burning proceeds. Great care, however, is requisite in the burning, as, unless properly burnt, the aggregate will destroy the concrete. It is not many years since a contractor had to pay 50l. for damages caused by the falling of the walls of two concrete cottages, in which unburnt shale and clay had been used as an aggregate.

Burnt ballast should be of a dark red or purple colour; a bright red colour indicates imperfect burning.

Coke-breeze, &c.—Coke and coke-breeze from gasworks, and holler cinders from factories, are often used in concrete for floors, roofs, and partitions, where lightness is a desideratum. Concrete made with such an aggregate, however, is not as strong as that made with either broken brick or slag or stone; this is accounted for by the inherent weakness of the coke, cinders, &c. The weight of the concrete floor itself is often a very large part of the load which it has to carry, and for this reason the strength should always be considered in conjunction with the weight. A light concrete of moderate strength may carry a greater added load than a stronger concrete of great weight. The experiments of Mr. Webster (see Table VIII., p. 113, ante) go to prove that coke-breeze concrete suffers less from heating and quenching than do concretes made with sand, pumice-stone, fire-brick, and slag.

A further advantage of coke-breeze concrete for floors is that it can be nailed to; floor-boards can, therefore, be laid directly upon it without the necessity of wood joists or fillets, or an intervening space for air (and dirt). But this very lightness and porosity is a disadvantage for walls, foundations, and other places in which it will be subjected to the action of the weather or of water, or where it will be expected to bear great weight. A very porous aggregate requires more cement than one of closer texture, and is not as strong; it is sometimes recommended that porous material should be soaked with Portland cement before using, but the cost of this would probably be more than that of getting a better aggregate. Some persons have objected to the use of coke-breeze concrete under hearths, as it is a comparatively good conductor of heat, and will, indeed, sometimes become red-hot and char, or even set fire to, adjacent woodwork (see the *Builder* for February 13 and March 19, 1892). Coke-breeze and similar materials ought to be well wetted before being made into concrete, otherwise they will absorb the moisture from the cement and prevent its proper hardening. As a rule, too, such aggregates contain impurities which ought to be washed away. The fineness of coke,

breeze is also a factor in lessening the ultimate strength of the concrete, it should not be used for external walls.

Slag.—Slag from iron furnaces is used not only for making cement, as already described, but also as an aggregate. It can be obtained from many ironworks in the form of sand, and also in sizes, suitable for various kinds of concrete, from 3/4-in. cubes upwards. It has been often used in harbour and dock-works, especially for face-concrete, for which its hardness and durability render it particularly suitable. For foundations, walls, and other places where weight is no objection, it is very useful. Slag-concrete varies much in weight, according to the nature of the slag. Some of it is lighter than Portland-stone concrete, while some is heavier than granite-concrete. On account of its weight it is not usually recommended for floors, although there are the counterbalancing advantages of greater strength and resistance to fire.

Shells.—Shells are also used for concrete in places where they are easily obtained, and in conjunction with gravel, or shingle, or other material, they make good work.

Resistance to Fire.—Mr. Webster's experiments, already mentioned, seem to show that the resistance to fire of various aggregates is as follows, in order of merit:—1. Coke-breeze. 2. Pumice-stone. 3. Fire-brick. 4. Slag. 5. Sand (and, presumably, gravel, or broken sandstone of similar composition). The difference between Nos. 1, 2, and 3, is, however, very little. Mr. Webster also obtained a 4-in. cube of:—1. Syenite from North Wales, and a 5-in. cube of each of the following stones—2. Porphyritic granite from Westmoreland. 3. Carboniferous limestone from Derbyshire. 4. Portland oolite. 5. Sandstone-grit from Darley Dale, Derbyshire, and 6. Sandstone-grit from Bramley Fall, Yorkshire. These cubes were simultaneously placed in a furnace heated to about 2,100 deg. Fahr., but cooling to about 2,000 deg.; they were removed in nine minutes and a quarter. The syenite, at a minute and a quarter, "cracked with a slight explosion and gradually broke into shelly fragments;" a large corner broke off the porphyritic granite after one-and-a-half minutes, and the remaining portion of the cube "afterwards cracked and crumbled to small fragments"; the limestone began to "calciné at the corners, and in about two minutes began to split up and crumble, the small pieces becoming calcined"; the Portland oolite "stood apparently intact for about three minutes, but a slight tap with an iron rod broke it into pieces, which commenced to calciné"; the two sandstone cubes stood "intact for about four minutes, when they commenced to scale and shell off," a small crack had appeared in the Bramley Fall stone in two minutes. From this test, Mr. Webster concludes that of these varieties of stone, granite is the worst, and sandstone the best for resisting the influence of fire. It has been known for a long time that granite soon succumbs to great heat, and one instance is recorded where "a granite post, 12 in. by 12 in., was reduced to sand by the same fire that burned into a wooden post next to the granite less than 1 in."

Strength.—The tensile strength of briquettes made with cements and various kinds of sands has been given in several tables, and nothing further need now be said on this point. The crushing strength of concrete made with Portland cement and various kinds of aggregates has been ascertained by Mr. Grant.* Six-inch cubes were made, kept in air for a year, and then crushed, one test only being made in each case. The proportions of the total number of blocks were compressed by beating the concrete into the mould with a small mallet; the remaining blocks were not compressed. The results may be tabulated (see Table, page 306).

Taking the whole of these results into consideration, we find the relative values of the different materials to be as follows:—Portland stone, 100; pottery, 74.4; granite, 68.6; glass, 58.3; slag, 59.5; flints, 56.3; and, lastly, ballast, 49.1. The roundness and smoothness of the ballast (presumably, "Thames ballast"), and the sand and dirt it contained, will account for its low position. The flints also give low results because of their smoothness and roundness, and, probably, dirtiness, while smoothness and brittleness account for the position of the glass and slag. Granite might have been expected to take a higher place; perhaps it contained a

* Proceedings Inst. C.E., vol. xxxii. (1870-1).

TABLE XX. (see page 305).
Crushing Strength (in tons per sq. ft.) of Portland-cement Concretes having various Aggregates.

No.	Nature of Aggregate.	Six to One.		Eight to One.		Ten to One.	
		Compressed.	Not Compressed.	Compressed.	Not Compressed.	Compressed.	Not Compressed.
1	Ballast	81.6	72.8	54	50	42	32
2	Portland Stone	162.4	120	132	98	88	76
3	Granite	122	89	78.4	58	62	46
4	Pottery	115.2	98.4	88	72	74	56
5	Slag	92	80	78	56	42	34
6	Flints	82	62	70	56	60	41.2
7	Glass	112*	66	72	54.4	50	40

* In Mr. Grant's table giving the strength of 6 inch cubes, the figure in this case is 28; possibly it ought to be 18, which would give 72 tons per sq. ft. instead of 112, and this would be more in keeping with the remaining tests with glass, and would relegate it to the lowest place but one.

considerable amount of dinst. It is also surprising to find Portland stone 25 per cent. better than even pottery; possibly, its angularity, hardness, cleanliness, and affinity for cement gave it the premier position.

Similar experiments with broken sandstone and with coke-breeze would have been valuable to architects.

OBITUARY.

MR. THOMAS WOOLNER, R.A.—We regret to announce the death of Mr. Thomas Woolner, R.A., which occurred on the 7th inst. in London. He was born at Hadleigh, in Suffolk, on December 17, 1826, and was, therefore, in his sixty-sixth year. It was in 1843 that he first attracted the notice of the public by his statues of "Queen Eleanor" and "The Death of Boadicea," which were succeeded at no long interval by "Puck," "Titania," "Eros and Euphrosyne," and "The Rainbow." About forty years ago he joined Mr. Millais, Mr. Holman Hunt, and Mr. Dante Gabriel Rossetti in starting a short-lived periodical called *The Germ*, intended to express the ideas of the pre-Raphaelites. Mr. Woolner's contributions being a series of poems, which were afterwards published under the name of "My Beautiful Lady." In 1871 he was elected an Associate of the Royal Academy, and three years later an Academician; while in 1877, on the death of Mr. Henry Weekes, he became Professor of Sculpture, a post which he resigned after his interval of two years.

MR. JAMES FOWLER, F.R.I.B.A., F.S.A.—We regret to hear of the death on the 10th inst., of Mr. James Fowler, of Louth, aged 63. As many of our readers will know, he was an architect remarkable for the artistic ability he displayed in the treatment of Gothic work. We hope next week to be able to say something more about him and his works, several of which have been illustrated in our pages. Mr. Fowler was a member of the Architectural Association, and used to take great interest in its annual excursions. He was ever ready to help young architects with advice as to their studies, and his loss will be very deeply and widely regretted.

GENERAL BUILDING NEWS.

RESTORATION OF LICHFIELD CATHEDRAL.—According to the *Birmingham Gazette*, the appeal made to the diocese of Lichfield in February for 20,000*l.*, to be expended on the fabric of the Cathedral, has so far resulted in donations amounting to upwards of 5,000*l.* With this sum in hand the Dean and Chapter have undertaken portions of the work. The stonework of the largest of the north windows is now completed, and it is hoped that the glass will be ready for insertion early in November. New mullions and tracery have been inserted in two of the windows on the north side of the Lady Chapel. This work was necessary for the preservation of the sixteenth-century Herkenrode glass. The adjoining buttresses have also been repaired, and the figures of Ruth, Esther, Anna, and Priscilla placed in the canopies. The western side of the north transept, repaired, and the buttress, which was ready to fall, is being re-built in accordance with the recommendation of Mr. Pearson, R.A., who has inspected the Cathedral and submitted a report thereon. The southern and eastern faces of the central tower are in process of restoration, and it is hoped that this work, together with the renovation of the northern and western faces of the tower and all necessary repairs to the spire, including a new lightning-conductor, will be completed next year. Next in importance to the work already in progress the Dean and Chapter consider the restoration of the south transept. In the report referred to Mr. Pearson urges that the gable end over the windows of the north transept ought to be restored; the

east and west walls also require repairs, and the upper part of the large buttress on the west side requires to be re-built, being in such a condition that it may fall at any moment. The spire of the central tower needs some repairs to the openings; some cement work must be removed and replaced with stone, and some crockets require to be renewed. Considerable restoration is needed on each side of the south transept, but more especially on the west side. As regards the design of the great south window, Mr. Pearson would be disposed to leave it as it is; and he would also recommend that no alteration be made in the curious tracery in the circular window in the gable. This gable end is flanked by large buttresses. The side walls towards the top have gone over at some time, but not to any great extent. A tie beam might be inserted near the base of the gable which would prevent any further movement, and the buttresses might be brought back to something like the form shown on the old prints. In the north aisle of the nave it is necessary to restore to some extent the decayed stonework of the windows, buttresses, and especially if covered with lead. Much restoration is needed over the walls and windows of the Chapter-house. There are some details around this building which ought to be restored as soon as possible. The damage done by the falling of the spire to the vestibule should be made good, and the groining restored.

NORTHERN HOSPITAL, WINCHMORE HILL.—The last of the new temporary huts for the accommodation of 200 fever patients at the Northern Hospital, for the Metropolitan Asylum Board, were handed over to the authorities on the 7th inst. These buildings, although termed temporary, are built with brick foundations on a concrete platform; the sides are of timber framing, covered on the inside with match-boarding, and externally with felt and weather-boarding, and the roofs are hoisted on principals, and covered with slating and Staffordshire ridges and hips. The wards are each 113 ft. long, and are provided with two centre fireplaces of glazed bricks, and with slow-combustion stoves, and at the ends kitchen, lavatory, and bath are fitted up with hot and cold water. The inside of the wards presents a cheerful appearance, the sashes and doors being painted white, and the match-boarding stained and varnished. Great attention has of course been paid to the sanitary arrangements, and the drainage is laid with Hassall's patent jointed pipes. The whole of the nine huts have been erected in the short time of seven weeks. The architects for the building are Messrs. Pennington & Bridgen, and the contractors are Messrs. H. Wall & Co., of Carlton Works, Kentish Town.

ADDITIONS TO ST. MICHAEL'S CHURCH, RUNCORN.—On the 29th ult. the Bishop of Chester consecrated St. Michael's Church, Runcorn, the nave of which has been opened for some time. A ritual chancel has been added, from designs by Mr. Barry, of Liverpool. The new chancel is 24 ft. in width and 41 ft. from the step under the chancel arch to the eastern wall. Adjoining the chancel on the north side are vestries for the clergy and choir, will throw the two rooms in one. The floors of choir and sacristy are of marble mosaic, of ornamental patterns laid in cement on a bed of concrete. The chancel is lighted by five pointed three-light windows, three of which are in the apse, filled with tracery of geometrical pattern in separate designs. The three windows in the apse are filled with stained glass. There is a carved credence table, of Caen stone, in the south-east wall, also a reredos of Caen stone and marble, and an altar rail. The whole of the woodwork and fittings are

of dressed pitch-pine, varnished. A stone arch arch jamba opening into the intended position of it tower, where the organ is hereafter to be placed, appear on the south side of the chancel. The contractors for the work are Messrs. Hughes & Stirling, Liverpool, and the mosaic floor was executed by Mr. Swift, of Liverpool.

THE BLACKPOOL TOWER.—At the meeting of the directors held at the Beach Hotel, Blackpool, of the 2nd inst., Messrs. Maxwell & Tuke reported that two of the tower legs are now erected to height of 55 ft., and a third one to a height of 30 ft. Messrs. Heenan & Froude are proceeding rapidly with the steelwork in their Newton Heath yards, and if the present rate of progress is maintained there is no reason why the tower up to 85 ft. high should not be completed this year.

NEW CONVALESCENT HOME AT HARROGATE.—On the 15th ult. a new convalescent home at Wetherby-lane, Harrogate, was opened by the Mayoress of Sunderland. The new home is the outcome of the movement in aid of the disaster that occurred in Sunderland in 1883, when 183 children lost their lives. Mr. John Eltringham, of Sunderland, was the architect.

CATHOLIC SCHOOL-CHAPEL, ST. HELENS, LANCS. CASHIRE.—On the 2nd inst. the foundation-stone of the new Catholic school-chapel, St. Helens, was laid by the Roman Catholic Bishop of Liverpool (Dr. O'Reilly). The new building will be in two stories, the lower portion being fitted up as a school room, and the upper portion as the chapel, but it will be so arranged that at some future date it can be converted into a school. The length of the building will be 66 ft. 6 in., and the width about 27 ft., while the total height is 44 ft. The building will be of brick, faced with red sandstone, and relieved with Accrington bricks. There will be an open roof, with pitched principals. The chapel will be reached by a flight of stone steps, with oak hand-rail. The total cost will be over 2,000*l.* The architects are Messrs. Sinnott, Sinnott & Powell, of Liverpool, and the contractor, Mr. James Almond, of St. Helens.

NEW MARKETS, HALIFAX.—On the 6th inst. Mr. Davis, Mayor of Halifax, placed in position a memorial tablet at one of the Southgate entrances to the new covered markets for Halifax, now in progress. The new markets, arcade, and shops completed in the scheme will cost not less than 105,000*l.* Messrs. Leeming & Leeming, of London, are the architects, and the contract for the masonry work has been entrusted to Mr. George Charnock, of Halifax.

NEW MARKETS, DUBLIN.—New fish and vegetable markets, which will shortly be opened, have just been built at Dublin. Mary's-lane, outside the markets, has been widened, and the roadway will be at least 40 ft. wide for a considerable stretch on either side of Halston-street. There are three entrances to the markets on the Mary's-lane side, one at either corner, and the central or principal one directly opposite Halston-street. The latter is a structure of the Corinthian order, with columns, capitals, and entablature, surmounted by two figures, one of them representing Justice and the other Honesty. In the centre are the City arms. The markets are 330 ft. long in the clear, with a width of 195 ft. The area is spanned by eight roofs, which are supported on fifty-six cast-iron columns and malleable arch iron girders. The floor of the markets is divided into ten large bays, which are concreted. The markets are divided longitudinally and transversely by a couple of leading roads for carts, with a roadway across each end for vehicles delivering produce. There are entrances for fish off East Arran-street and St. Michael's-street, and an entrance common to both markets off Fisher's-lane. Refreshment-rooms, separate, have been provided for men and women, and between these departments is the eaters' room. Lavatory accommodation is also furnished, as well as a cloak-room. The superintendent is provided with a house and stores. Hydrants are provided all over the floors, with a good supply of water for cleaning purposes. Mr. Wilson was the architect, the engineering work having been carried out under the supervision of the Borough Surveyor, Mr. Spencer. Messrs. W. G. Gandy & Co., of Dublin, were the contractors. All the ironwork in the markets was executed by Messrs. Lysaght, of Bristol.

APPLICATION OF WIND POWER.—One of Messrs. Alfred Williams & Co.'s Halladay windmills has lately been erected on an estate at Backwell, near Bristol, where there has hitherto been great difficulty in getting a sufficient supply of water on account of the elevated position of the estate. Water is now taken from the Bristol Water Company's main, which supplies a tank situated at a level 130 ft. above Ordnance datum, being the foot of the hill approaching the estate. The windmill is placed over this tank, and is coupled direct on to the pump. The lift from this point is 360 ft., through 2,500 ft. of pipe, and the water is delivered into a storage-tank of about 6,000 gallons capacity, from which it flows to the mansion. The work was carried out under the direction of Messrs. John Taylor & Sons, of Westminster.

SANITARY AND ENGINEERING NEWS.

SEWAGE DISPOSAL AT NORTHAMPTON.—At a Town Council meeting held at the Guildhall on the 3rd instant, it was resolved, by a majority of seventeen votes to six, to adopt Mr. Bailey Denton's report to increase the area of the existing sewage farm by the purchase of 200 more acres of land, and to purify the sewage of the town by means of filtration and in aeration tanks.

PROPOSED NEW PIER AT WESTON-SUPER-MARE.

On the requisition of some twenty ratemayers, a public meeting was recently convened at the Town Hall, Weston-super-Mare, to consider the advisability or otherwise of constructing a new pier from the end of Regent-street or elsewhere. The communication which was read from the engineer, Mr. Munro, of Bristol, stated that the proposed pier would afford a good promenade, and also facilities for light goods traffic by means of a tramway; also a pier-head from whence steamers might embark and disembark passengers at all states of the tide. The structure would be 2,200 yards in length and 16 ft. in width, whilst the pier-head would be 160 ft. by 50 ft. Of the width, one half would be for a promenade, and the other for the tramway. From the pier-head there would be a depth of 10 ft. of water at the lowest tides, whilst at the same time it would be out of the reach of the channel currents. The structure would be of wrought-iron columns, iron lattice work, and wood flooring, whilst the pier-head would be constructed of green-belt granite. In the pier-head it is proposed to put twelve widenings, each 50 ft. by 8 ft., in which shelters might be erected, and on the pier-head a pavilion would be provided for concerts, &c. The tramway would be worked by endless wire rope, with a stationary engine mid-way.—After some discussion, a general committee was appointed to further the project.

NEW BRIDGE ACROSS THE RIVER DER.—A new suspension foot-bridge across the Der at Polkhuish, about two miles above Ballater, was opened on the 6th inst. by the Duchess of Albany. The bridge is the gift of Mr. Alexander Gordon, London, a native of the district. The bridge is of the diffused lattice girder description, and is 195 ft. in length, with a breadth of roadway of 4 ft. The height of the roadway above the water is 12 ft. The foundations are all of concrete. The lattice members are of steel, and 23 ft. in height. Two 1-in. steel iron cables, with a breaking strain of 70 tons, carry the bridge. The roadway is stiffened by two side lattice girders standing 3 ft. 9 in. high, while the flooring is covered with wrought-iron square-plated plates. Messrs. Abernethy, Aberdeen, were the designers and contractors.

FOREIGN AND COLONIAL.

FRANCE.—The Duc d'Aumale has just presented to the Museum of Decorative Arts the model of the "Carls" which the artist sculptor Auguste Cain has executed in bronze for the chateau of Chantilly.—The museum at St. Germain has recently received an important collection of drawings, engravings, and photographs of prehistoric objects, Celtic, Gallo-Roman, Merovingian, and Carolingian. Last Sunday a monument was inaugurated at Aubervilliers, to the memory of several millerlymen who were killed by an explosion. The monument, which is of a pyramidal form, is surrounded by cannons tied by chains.—In November the interesting objects collected in Central Africa by M. Dybowski will be exhibited in the Natural History Museum.—M. Théophile Barau, sculptor, has lately been made Chevalier of the Legion of Honour. His statue of Kolleremann was recently inaugurated at Valmy.—MM. Besson, sac Boisson, Paul Buffet, and Guillonnet have just been admitted into the competition for the Jarvin (Attainville prize (historical painting section), the subject given is the decoration of a ceiling with a mythological scene in the centre. MM. Amédée Buffet, Foreau, and Frossin have also been admitted into the landscape section of the same competition. The subject given is a sacred wood, in which a young girl is bringing an offering to a fawn. The judgment will be given on the 25th inst.—At Marenes (Charente Inférieure) a monument has been inaugurated to the memory of the Sous-Prefet vetero, who reclaimed all the marshy land about his part of Saintonge. The monument is by the sculptor, near Havre, has the shape of a distance of 350 metres.—To-morrow, October 16, a monument to the memory of M. Dorian is to be inaugurated at Montbelliard. M. Dorian was late member of the National Defence.—At Reigner (Haute Savoie) the first stone of a charitable institution has just been laid; it is to be a building commemorating the centenary of the annexation of France and Savoy, and will bear the inscrip-

tion, "L'ASIE du Centenaire."—The sculptor, Edmond Pevot, Professor at the Ecole des Beaux-Arts at Bordeaux, has just died at the age of fifty-four. He was born in Paris, had studied in Joutroy's atelier, and exhibited at all the Salons.—The painter Emile Lignol, the oldest member of the Section of Painting at the Academy des Beaux-Arts, has died at Montmorency at the age of eighty-eight.—M. J. Dubuy, sculptor in the law of the painter Resnard, has also died, at the age of eighty.—The death of M. Charles Giraud is also announced at Saurois, at the age of seventy-three. He was father of the painter Eugène Giraud, and was known for his marine pictures, which were ordered by Government.—He preferred painting scenes in Breton life.—A competition has just been opened by the town of Saint Briens (Côtes du Nord) for the rebuilding of the parish church of Cesson-Saint-Briens.—M. Fraissinet-Jouve, architect at Marseilles, has just died at the age of thirty-six.—We have also heard of the death of M. Arsène Descaves, late architect of the Department of the Haute Marne. He died at Chaumont, aged seventy-seven.—The 17th inst. the competition opened by the Ville de Paris for the decoration of the two large halls in the Hôtel de Ville will be closed. The objects of the competition comprise a great ceiling decoration, scutcheons and spondrels for each salon; this compels the competitors to reserve a certain part for architectural decoration. The exhibition of designs will be held in the Champs de Mars, in the Palais des Beaux-Arts.

BERLIN.—A provisionary place of worship, which is to be used whilst Professor Raschdorff's cathedral is being erected on the site of the old "Dom," will be opened this month. The building consists of an iron framework construction with polychrome brick surfaces on the exterior, and a simple treatment in stucco in the interior.—The competition for designs for the proposed "Provincial Museum" at Berlin has been opened. Three premiums (200*l.*, 125*l.*, 75*l.*) are to be given, five eminent architects and officials of the Government Board of Works acting as assessors. There is no limit of cost mentioned in the "programme," only competitors are reminded that luxurious decoration would be out of place. The site for the new museum is in the city proper. There will be an exhibition of all the designs sent in at the Town-hall. Candidates are allowed four months for the preparation of their drawings.—Only twenty-three designs have been submitted to the assessors of the great Dresden "Central Station" Competition. There will be an exhibition of the drawings in the new Royal Academy Rooms.—The pianoforte manufacturer, Eschlein, has built a new concert-hall, with seating capacity for an audience of 500. Professor Schwechten, who is an authority on questions of acoustics, acted as architect, and has given a successful practical demonstration of his theories. The decoration of the hall is in very light colours.

—Art critics consider the Furniture Show which has been opened at the "Landesausstellungen Palace" to be disappointing on account of the little progress made in design since the last exhibition of this kind, which was held in 1879. "Cheap and bad" is the order of the day.—The architect of the new Imperial Houses of Parliament has decided to send a model of this building to the Chicago Show. The model, which is being made by Professor Lessing to a scale of 1/25, will be the counterpart in the German architectural section. The Municipal authorities of Berlin have voted 27,000 marks for the exhibition of some examples of the work of their building departments. Among the exhibits which the City Architect will send are drawings of the Urban Hospital, three lunatic asylums, the central covered market, the slaughter-house, and a number of bridges. Some 85 square metres of wall surface and 20 square metres superficial have been reserved for the exhibits of this department alone.—Our contemporary, the official *Centralblatt der Bauverwaltung*, in some descriptive notes on the extra hospital accommodation at Hamburg, does not accuse the authorities for being unprepared for an epidemic. There is no doubt that the water supply is very bad; that evil has, however, been a chronic one, and need not be confused with questions relating to the measures taken by the authorities when the danger of the plague was apparent.—The new Theatre "Unter den Linden," which has been opened for variety entertainments, has cost the proprietor 75,000*l.* An hotel and a restaurant which have been built in connexion with the establishment cost another 50,000*l.* The erection of the hotel was in the hands of Messrs. Croner & Wolfenstein.

SWITZERLAND.—Sixteen designs were sent in for the Basle University Library Competition. Mr. Richard Kuder, of Strasburg, who submitted an academical plan of great excellence, received the first premium. A new museum is to be erected at a cost of 400,000 francs, of which 300,000 were voted by the Government.—In the limited competition for the design of a new "Tonhalle" at Zurich, the first prize has been given to Messrs. Fellner and Holmer, of Vienna.—There is to be a competition for models of some sculpture, which is to be placed on the facade of Semper's technical college. Twelve thousand francs are to be given in prizes.

MISCELLANEOUS.

ROYAL SOCIETY OF ANTIQUARIES OF IRELAND.—The fourth annual meeting of the members of the Royal Society of Antiquaries of Ireland was held on the 11th inst., in the Lecture Theatre of the Royal Dublin Society. Mr. Thomas Drew, R.H.A., presided. The Chairman read a letter from Mr. Herbert Gosnell, the secretary of the Royal Archaeological Institute of Great Britain and Ireland, accepting the invitation of the Society to hold the annual meeting of the Institute for 1893 in Dublin. The Chairman also mentioned that the annual meeting would be held in August of next year, and that there were invitations from Cork to the Archaeological Institute to hold a meeting there immediately afterwards. Mr. William Frazer, Fellow, then delivered a lecture on the "Rarer forms of Irish tiles," and gave illustrations by means of coloured drawings.—Mr. Frazer read a second paper, which dealt with the subject of recent finds of brass money of the time of James II., and the last paper read consisted of extracts from the records of the Corporation of New Ross, compiled by Col. Vigors, J.P., Fellow. Six other papers were taken as read. Several photographic lantern slides of the tumuli and inscribed stones of New Grange and Dowth were then exhibited by Messrs. G. Coffey, B.L., and L. R. Strangways, M.A. A letter was read from Miss Frances Keane, of Cappoquin, calling attention to the fact that Sir Walter Raleigh's house at Youghal was to be taken piecemeal to the Chicago Exhibition, and suggesting that the Society should take the initiative in an attempt to rescue it, and keep it intact where it was at present.—Mr. Bortchaell said that although the Society was not in a position to acquire possession of the house, its members might aid in the collection of subscriptions for that purpose.—The Chairman said that such an operation was being taken down the house and re-erecting it, was, in his opinion, impossible, as it was mattering with age.

AUCTIONEERS' BENEVOLENT FUND.—The annual general meeting of supporters of this fund was held on the 12th inst., at the Auction Mart, Tokenhouse-yard, E.C., the treasurer (Mr. Daniel Watney) presiding. The report for the year ending June 30 last was submitted, and stated that the subscriptions amounted to 300*l.* 6*s.*, and the donations to 29*l.* 3*s.* As the result of a legacy left by the late Mr. F. A. Newson, of Islington, the sum of 89*l.* 5*s.* 9*d.* in two and three-quarter per cent. Consolidated Stock had been transferred to the trustees of the fund. The total investments now exceeded 7,300*l.* The sum of 9*l.* had been given by way of donations to deserving applicants, one annuity had been increased from 16*l.* to 20*l.*, and a fresh annuity of 20*l.* had been allotted to Mr. Stanley Robinson. The total sum now paid in annuities was 222*l.*, as against 193*l.* in 1891. On the motion of the Chairman the report was adopted. The meeting then considered and adopted a resolution proposed by the Chairman, to the effect that it was desirable that the Society should be formed into a company, and application made to the Board of Trade for a licence under the 23rd section of the Companies Act, 1867. Mr. J. F. Field was then added to the committee, and the six members who retired by rotation were re-elected.

PROPOSED NEW RAILWAY FROM MANCHESTER TO GLASGOW.—A meeting of local bodies was held at Newcastle on the 16th inst. to consider the proposed new line of railway between Manchester, Newcastle, and Glasgow. Mr. Baker and Mr. Cooper, engineers, of London, explained the history of the scheme and the proposed route. If support was adequate the whole scheme would be promoted in one Bill in the ensuing session. The line from Manchester to Newcastle would be from Manchester to Bacup and Burnley, thence to Richmond and on to Newcastle, with duplicate line to Sunderland, and another across the Tyne down to Albert Edward Dock, North Shields. From Newcastle the line would go to Hawick, thence to Biggar, and through the Lanarkshire coal-fields to Glasgow. The saving of distance between Manchester and Newcastle would be about 23 miles, and between Newcastle and Glasgow 45 miles. The cost of the whole scheme was estimated at from £3,000,000 to £10,000,000, the probable cost per mile being £35,000. The route presented no great physical obstacles, and the gradient would not be more than 1 in 100. The terminus at Manchester would be independent, but connections to London could be arranged with other companies. A committee was appointed to take joint action with other committees already existing, and to confer with the solicitors and engineers for the scheme.—At a meeting of a special committee of the Newcastle Corporation it was decided to support the scheme, and to raise a large sum of money in the town for its promotion.—At Sunderland a meeting decided to support the scheme.

THE JUNIOR ENGINEERING SOCIETY.—The annual general meeting of this Society was held on the 7th inst. at the Westminster Palace Hotel, Mr. Sidney Boulding presiding. The eleventh session's report of the Council was presented, in which it was stated that there were at the present time 291 names on the books, as against 253 at the corresponding period last year. As indicating the growth of the Society beyond the precincts of London it was

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Appointments to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv, vl, & viii. Public Appointments, p. xviii.

mentioned that there were fifty-six members in the provinces, the colonies and abroad. Seven meetings had been held during the session, with an average attendance of sixty. From October to July twenty visits to engineering works in and near London took place, the attendance averaging fifty-five. The usual week's provincial summer excursion has been to Cheshire and Lancashire, twenty-four works, &c., having been visited.

NEW CLOCK, GAINSBOROUGH.—A new eight-day illuminated turret striking clock has been presented to the new Market-hall, Gainsborough, by the Chairman of the Board, Mr. E. Pearson. The time is shown upon a large skeleton dial, which forms the circles, figures, and minutes, and glazed with white opal glass for illumination. There is also an automatic gas apparatus fixed to the clock movement for turning on and off the gas according to the season of the year. Messrs. Potts & Sons are the makers, and the general construction is similar to that of their clock at Great Salkeld, described in our last issue.

BLACKPOOL ELECTRIC LIGHTING.—The contract for the Blackpool electric light station has, we understand, been awarded to Messrs. Hammond & Co., of London.

"COTTAGE GARDENING."—Under this title has just appeared a halfpenny weekly journal "for every cottage home." The low price is probably the right policy if it is to circulate widely among the poorer class of readers, and the little journal appears to include a great deal of information and some good cuts at this low price, so that we hope it will be a success.

THE ENGLISH IRON TRADE.—Although a slight improvement is shown in the Board of Trade Returns, there are few signs of amelioration in the English iron market. The crude material generally is quiet, and values are barely upheld, whilst in finished iron further reductions are reported in the North of England and in Scotland. In steel there is little change to record. Shipbuilding is depressed, and the engineering trades are on the whole slack. The coal trade is rather more active owing to the colder weather experienced.—Iron.

EXTENSION OF ABERDEEN UNIVERSITY.—We learn from the Scotsman that Mr. Charles Mitchell, of Newcastle, has offered 13,000*l.* to build a block in the rear of Marischal College to contain a Graduation Hall and Students' Union, on condition that the plans are approved by the University Court and the Executive Court. It is stated that, including a grant of 40,000*l.* from the Government, a sum of more than 80,000*l.* is now secured for the proposed extension of the University.

PUBLIC IMPROVEMENTS AT HALIFAX.—According to the Leeds Mercury, the Corporation of Halifax have for some considerable time past been engaged on a series of public improvements in the centre of the town. The works in question include the widening of Old Market, of Corn Market, of Market-street, and of Russell-street. The Corporation have also made a commencement in another part of the town with a scheme for the abolition of the overcrowded and insanitary areas of the town. The first instalment of this work is in progress in King-street and the vicinity, where the removal of a quantity of somewhat dilapidated property has cleared a site of 1,840 square yards. Of this, 125 yards will be utilised for widening the street, which will ultimately have a breadth of 44 ft.; and on the remainder of the land it

is proposed to erect workmen's dwellings. The cost of the scheme will be about 23,000*l.* The complete scheme as relating to the portion of the town under notice provides for dwellings for about one hundred families. At present, however, dwellings for thirty-four families only will be erected in system. The lower portions, which are intended for aged couples, or for persons living alone, will contain one living-room, a scullery, and the usual conveniences. The upper flats will contain a living-room and two bedrooms. At present the Council are confining their attention to King-street and Cripplegate, but this is only the commencement of a series of schemes by which it is hoped to rid the town of the holes of the "rookeries" and insanitary areas which it contains.

NEW RAILWAY NEAR LEAMINGTON.—Messrs. Walter Scott & Co., of Newcastle, have obtained, we understand, the contract for the construction of the new line of railway from Daventry to Marton, near Leamington. The amount of the contract, it is believed, is about 150,000*l.* The new line will be close upon 14 miles long.

MEETINGS.

TUESDAY, OCTOBER 13.

Sanitary Institute (Lectures for Sanitary Officers).—Professor H. Robinson on "Sewage Disposal." 8 p.m. Glasgow Architectural Association.—Mr. W. Key on "Mechanical Ventilation: Propulsion v. Extraction." 8 p.m.

WEDNESDAY, OCTOBER 19.

Builders' Foremen and Clerks of Works' Institution.—Quarterly meeting of the members. 8.30 p.m.

FRIDAY, OCTOBER 21.

Architectural Association.—Annual General Meeting. Address by the President, Mr. H. O. Cresswell. 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. H. H. Collins on "Sanitary Building Construction." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

3,009.—VENTILATING APPARATUS: E. Oldroyd.—This is an invention relating to improvements in the means or apparatus whereby fresh or cool air may be supplied to any kind of building through openings in connexion with the outer atmosphere. The air, after being admitted to the basement of the building, may be warmed or heated prior to being conveyed by suitable tubes into a room or apartment, provision being also made by which the heated or vitiated air may be withdrawn from such room by means of a second set of tubes into what is termed an extracted-air chamber, whence it may either be allowed to re-circulate through the building or be withdrawn into the chimney by an air propeller, extractor, or fan, thus permitting the air to be constantly changed.

715.—GULLY TRAPS: G. Cozens.—This invention refers to an improvement in gully traps, more especially applicable to street drains, and has for its object the prevention of any back flow of water into the street or rising of noxious gases from the drains through the gully. To effect this an iron frame is provided inside the casing forming the water seal, having an internal sloping ledge extending across it and a narrow ridge or projection on the walls of the frame continuous with the ledge, forming with it a rectangular opening, and a

hinged flap capable of closing the opening. This flap or flap is held against the ledge of the frame by means of a lever also hinged and weighted on one end, the other end resting against the bottom of the flap, the weight and casing it to hold the flap in its uppermost position. The flap is provided with a sheet of india-rubber on its upper side, in order to make a tight joint with the above ledge.

9,332.—PAVEMENTS: A. J. Bondt.—This specification describes an improved pavement combining the good qualities of stone, wood, asphalt, and other firm pavements, and obviating many of the difficulties incident to each. The pavement and roadway are constructed by first laying upon suitable ties or stringers a series of parallel flat iron rails, laid with their top surfaces flush with the general surface of the roadway, the rails being of sufficient width and located so to be adapted to wheels of common vehicles and filled in between with macadam or similar composition, or with macadam or composition combined with stone.

NEW APPLICATIONS FOR LETTERS PATENT.

September 26.—17,117, G. Bartlett, Ventilator.—17,132, F. Ashwell and D. Seebil, Valves for Heating and Ventilating Radiators.—17,127, W. Sterling, Sanitary Pipes.—17,154, W. Facey, Hydraulic Jacks.

September 27.—17,177, T. Banford, Hinges.—17,181, W. Oakes, Stove Combination Stoves, Fireplace, and Ranges.—17,232, L. Sapundoroff, Metallic Facing Plates for Bulbines.—17,238, The Ruble American Blower and Injector Co. and another, Ventilators.—17,238, I. Smolenski, Mire and Joint Cramp.—17,268, A. and H. Brentnall, Trellis Work and other Wire Work Light Ironwork.

September 28.—17,271, R. Bell, Heating, Ventilating and Cooling Apartments of Buildings, &c.—17,273, J. M. Oakes, Frying and Frying and Frying and Frying pipes or drains for testing same.—17,279, J. Kleyer, Device for Stopping or Sealing Drains or Pipes to permit of the smoke test being applied.—17,313, J. Eves and M. Greaves, Ventilators.—17,319, C. Timms, Doves, Stops and Holders.—17,340, M. Fremont, Coverings for Water-closet Seats.

September 29.—17,383, M. Kimberley, Sash-fasteners.—17,385, J. Dougherty, Sanitary Engineer's Apparatus for Examining Drains.—17,403, J. Sheppard, Sash-balances.

September 30.—17,442, J. Russell, Stove Grates.—17,483, M. Scott, Moulding Dies.

October 1.—17,501, W. Ross, Jnr., Water Waste Preventers.—17,544, A. Storey, Clamp or Vice.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,776, L. Young, Telescopic Tubular Window Ventilator.—14,985, J. Day, Water-closets, more especially in closets for utilising waste water.—15,046, A. Fowler, Water-closets.—15,222, J. Webster, Stoves, Grates, Basins of Water-closets, Bath-pans, &c.—15,209, W. Brooker, Door-fastenings.—15,241, J. Townsend and W. Griden, Preventing Waste of Water in Water-closets and other places.—15,240, E. Johnston, Stoves, Grates, and Ranges.—15,934, J. Bilton, Decorating Ploisters, Porcelain Tiles, Bricks, &c.—15,997, W. La Grande, Workmen's Time Recorders.—16,067, J. O'Rourke, Galleons.—16,234, W. J. de la Rue, Electric Call-Block Indicators.—18,415, M. Turpin, Parquet Floors and Wall-Indicators.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

19,887, A. McKeerney, Hanging of Doors and Shutters, whereby the closing of same may be rendered automatic without the aid of springs.—20,857, The Bowditch Gate and Shutter Company, Limited, The Bowditch Automatic Clutch Bolt Lock.—4,878, W. Sterling, Sanitary and other Pipes, and an Improved Method of Constructing Sewers and Drains.—14,871, W. Drayson, Starting Syphons of Fishing Gutters.—15,341, J. Pulen-Burry, Roofs of Horticultural and other Buildings.

NORTH SHIELDS.—For the erection of warehouses, Union Quay, North Shields, for the borough of Tynemouth Corporation. Mr. J. F. Smith, C. E., Borough Surveyor. Quantities by Mr. George Bell, 60, Collingwood-street, Newcastle-upon-Tyne:—
 Leighton & Bay £2,451 0 G. Park £2,188 0 0
 J. & W. Shippam 2,225 0 F. Robinson 2,112 0 0
 H. Brown & Co. 2,108 11 J. L. Miller 2,109 9 0
 T. W. Weir 2,102 15 Johnson & Son 1,765 15 0
 * Accepted. J. Waldram.

OXFORD.—Accepted for the erection of semi-detached villas at Oxford, Surrey. Mr. William J. Ingram, architect, 4, Threadneedle-road, B-4-17, row, W.C.:—
 J. Carrick £229 0 0

SOUTHAMPTON.—For rebuilding the "Warcham Arms," Park-view, Southampton. Messrs. W. H. Mitchell, Son, & Gutteridge, architects:—
 Wm. Franklin £1,953 0 H. Cawte £1,815 10
 Brunton & Bone 1,825 0 J. Cr. ok & Son 1,487 0
 H. Stevens & Co. 1,567 0 * Accepted.

SOUTHAMPTON.—Accepted for the extension of baths, for the Corporation. Mr. W. R. G. Bennett, County surveyor, Municipal Offices, Southampton:—
 Roe & Co., Southampton £50 0 0
 Roe & Co., Southampton 145 0 0

TOTTENHAM.—For fitting up 500, High-road, Tottenham, for the "Home and Colonial Stores." Mr. R. Willy, architect, 23, New Bridge-road, E.C.4.:—
 Kirby & Chase £125 Houghton & Son £108
 Halliday & Greenwood 123 Miller (accepted) 84

TUXFORD.—For the construction of sewers on the "Heath," Tuxford, for the Tuxford Union Rural Sanitary Authority. Mr. John Collyer, Surveyor to the Rural Sanitary Authority. Quantities not supplied:—
 F. J. Smith £318 0 0 Geo. Law £279 0 0
 F. J. Smith 313 10 0 Samuel Prestig, Wood Ribi, Malabar 253 11 0 lands near Tuxford* 274 18 6
 * Accepted.

WARRINGTON.—For the erection of a chimney-shaft, How'ery, for the Town Council. Mr. Thomas Langlin, Surveyor, Town-hall, Warrington:—
 J. Gibson & Son, Warrington £136 10 0

Works at 1a, Sidney-street, Goswell-road.—In the list of tenders for this job on p. 291, the last name should have been Holbrook, instead of "Holrook," as printed.

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T. W. A. B. (not within our province)—H. J. D. (too late this week).
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 Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.
 We cannot undertake to return rejected communications.
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The Builder.

Vol. LXIII. No. 264.

OCTOBER 22, 1892.

ILLUSTRATIONS.

Design for a Chapter-House.—By Mr. Heber Rimmer	Double-Page Ink-Photo.
Competition Design for Glasgow Art Gallery.—By Mr. A. N. Prentice, A.R.I.B.A.	Double-Page Photo-Litho.
New Tower, St. Mary's Church, Lynton, Devon.—Mr. H. Wilson, Architect	Double-Page Ink-Photo.
Crematorium, Manchester.—Messrs. Salomon & Steinhilf, Architects	Two Single-Page Ink-Photo's.

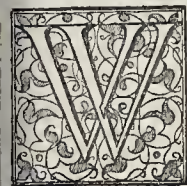
Blocks in Text.

Canopy of Bier-Stand, Manchester Crematorium	Page 320
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"Architecture—A Profession or an Art?"



WE give the words of the title of the volume of essays published under the editorship of Mr. Norman Shaw and Mr. Jackson* in the form which it appears to us that

the title requires, to give it the point or meaning which is apparently intended, though we observe that the sign of interrogation is omitted in the printed title. The book may be taken to express the views of the architects who for convenience have been referred to as the "Memorialists," and consists of short essays on subjects connected with architecture and architectural training, by Mr. Norman Shaw, Mr. Micklethwaite, Mr. Reginald Blomfield, Mr. Bodley, Mr. Mervyn Macartney, Mr. Ernest Newton, Mr. E. S. Prior, Mr. John R. Clayton, Mr. Basil Champneys, Mr. Lethaby, Mr. W. B. Richmond, Mr. G. C. Horsley, and Mr. T. G. Jackson, the latter of whom also contributes a short introductory chapter.

Our first reflection on reading the book is that it is a very great pity that a set of essays containing so much that is true and well put, and so much real enthusiasm for architecture in its highest sense, should have been produced with a pronounced polemical motive which runs through it all, instead of being published solely as an effort to lead public opinion and taste towards a higher appreciation of the value and nobility of architecture as an art. As such it could have done nothing but good. But while the authors again and again assert that the Institute of Architects, instead of contending for the good of architecture, is contending for its own advantage only, no one who knows and has followed these discussions out of which the book may be said to have originated can help seeing that the authors of it are at least equally divided in motive between an enthusiasm for architecture and a desire to run down the Insti-

tute, and that under the influence of this latter desire they have been led into no little unfairness and a certain amount of what can only be called misrepresentation. Unfortunately the outside public, many of whom will read the book (which is a thoroughly interesting one), know nothing of the discussions which led to it and of the polemical motive which underlies it, and will be led to take as accepted facts what are really more like the partial representations of a counsel for the prosecution.

There are two points in particular in which the action and motive of the Institute of Architects in instituting an examination test for entry to its ranks is misrepresented, and in regard to one of these at least the misrepresentation appears to us to be quite inexcusable. It is asserted in two of the essays (Mr. Jackson's and Mr. Blomfield's) that the Institute was only influenced in its course by the activity of a mushroom society—they do not call it that, they speak of it as if it were a Society on a level with the Institute—which set up a cry for the compulsory registration of architects, and that the Institute has only been endeavouring to put itself in touch with a public movement and to turn the flank of the interlopers. Now the authors of both these essays obviously read the *Builder*, as they make several references to it; and if so, they certainly ought to know what was the real character of the abortive effort to get registration of architects into Parliament, what sort of people promoted it, and why it was that all men who understood anything of the matter and cared anything for the dignity and respectability of the "profession or art" set their faces against it. We spoke plainly enough on the subject, at all events. And now it is pretended by the memorialists that the Institute was utterly inconsistent and obviously acting from interested motives, because it opposed the Registration Bill, and yet wished for an examination test of its own. Cannot they see the difference? Are they really ignorant of the fact that one of the main provisions of the Registration Bill was to at once legalise and register every existing person who called himself an architect—in other words, to give a recognised status to every jerry-builder or estate agent who had chosen to put "architect" on a brass

plate on his door? Do they really mean to say that the Institute of Architects ever contemplated anything parallel with that? If so, they are very much misinformed; and on such a serious matter it is surely the duty of those who write what the public will read to make themselves acquainted with facts and represent them accurately. Granting the principle that a fence to the adoption of the profession of architecture is advisable (which we pass over for the present), the idea of the Council of the Institute was that in process of time the Institute would, under their new system, consist of men all of whom had given evidence of a certain standard of technical knowledge and a certain standard of education in architecture, and that as this came to be recognised the architects would support it and the public would recognise it, and that the result in the end would be a gradual elimination of incompetent persons from the ranks of those called architects. There are of course objections which may be urged to this view, on general principles—reasonable objections; but to say that this is on the same footing with a proposal to give a Government statue, at one swoop, to every "architect" who has a brass plate on his door, is thoroughly unreasonable.

The other point is the persistent assertion, repeated in several parts of the book, that the Institute professes by its examination system to protect the public from bad architectural design. It has never, so far as we know, made any such profession. It has only professed to protect them against being taken in by so-called architects who have no education or training such as would justify them in assuming the name; that is all. It can no more protect the public from bad architectural design than the Royal Academy can protect it from bad pictures; and, as far as we have observed, it has never made any such profession. The fact is that the claims of the Institute in regard to its examination have been exaggerated by the memorialists for the purpose of strengthening their case, on the system always employed by "counsel for the prosecution." That there has been a certain amount of talk on the subject from individual members of the Institute, which is in bad taste, is true enough; but it is not fair to make the Institute officially responsible for that.

* Architecture—A Profession or an Art: Thirteen short essays on the qualification and training of architects. Edited by R. Norman Shaw, R.A., and T. G. Jackson, A.R.A. London: John Murray. 1892

Mr. Norman Shaw's paper, the first after the Introduction, deals with "The Fallacy that the architect who makes design his first consideration must be unpractical." We really did not know that any such fallacy existed, except among such people as Lord Grimthorpe and his admirers, but we quite agree with what is said in the latter part of the chapter, that "a true architect is far more likely to be a practical man, than a practical man to be a true architect;" and that Brunelleschi and Wren, who were capable of magnificent architectural conceptions, were also men of great practical attainments; we should hesitate about Mr. Shaw's inclusion of Michelangelo's name in the same list, as the construction of his great dome failed sufficiently at least to show that he was not master of his subject as Brunelleschi and Wren were. This and much else in the chapter is quite true. It is quite true that "to force such questions as drainage and knowledge of materials into the foremost position, placing design and all that makes the art glorious in the background, betrays either the absence of all due sense of proportion, or else it is a mere subterfuge to draw attention from the really important question." But who wants to do this? Not the Institute in its corporate capacity certainly, and the insinuation is unfair if made in that sense; although there are plenty of individuals in the Institute, some of them in the habit of making themselves prominent in season and out of season, to whom it may apply only too well.

We have every sympathy with Mr. Shaw's views about "professionalism,"—that it is not the professional side of architecture "that ever has or ever could give a human soul one ray of pleasure"; that "what we so earnestly desire is that architects should be architects: surely no unreasonable demand." If by "professionalism" Mr. Shaw means the sort of architects who sit in offices writing, while draughtsmen make their designs for them, we hold up both hands for him. But with all this Mr. Shaw cannot but admit that "an architect is an agent, that though he is employed and paid by his client, he has duties to discharge to the builder who is working under him no less important than those he owes to his employer; should he allow bad workmanship to pass, or should he allow the builder to fall in carrying out any part of his contract, he becomes personally responsible to his client. On the other hand, he has to control his client's demands." Now all that is certainly business rather than art, and as Mr. Shaw admits its importance, it seems that he must admit what can only be called the professional element into an architect's work, after all, and the admission clashes oddly with the sentence on the next page, that the art of architecture "is on precisely the same footing as painting and sculpture." It may be open to question whether it is on quite the same footing even as an art, but in practice at all events it is an art hampered with business considerations from which sculpture and painting are free, and in practice these cannot be separated from the art, except by the device of having two partners, one to plan and design and the other to supervise contractors' work and accounts; a division of labour which we believe is not unknown. And while Mr. Shaw on one page speaks of architecture as a pure art, on another he admits that the architect is practically hampered by business matters which are certainly of the nature of "professional" work.

This effort to lift modern architecture, as one of our French contemporaries observed, "into the region of pure æsthetic," runs through the whole book, and is in fact the ostensible pretext for the attack on the Institute, which wishes, it is asserted, to put this purely intellectual art into leading-strings. Yet the first and leading essayist is obliged to admit a great deal into his scheme of an architect's work which is not art. Mr. Jackson's paper on "True and False Ideals in the Education of an Architect," so far as it keeps to the subject indicated by its title (all the writers

in the volume seem to claim a right of rambling a good deal), of course urges that it is a low ideal to study only to pass an examination. There we agree with him fully. But does it follow that students who enter for the Institute examination (or for any other examination) should necessarily take this miserable view of the matter? Mr. Jackson seems to leave out all idea that an examination programme may be a very useful landmark to a student. One young architect wrote to us from Scotland a letter in which he declared that the Institute programme for examination was the first real guidance he had had in his studies, and that he considered "it would be a lodestar to thousands." Amid the various references to our columns among the essays, we have not seen any reference to that letter,* which we think most of the writers must have seen, and which certainly was one of the most pointed and practical contributions to the correspondence on the subject which we have published.

Mr. Jackson draws a terrible picture of the future of the young architect who has passed the Associateship examination, and who "is dubbed architect and admitted to the ranks of the Institute:—

He is now a person whom the public can employ without fear of "costly disappointments," and if he rests on his laurels and thinks he knows as much as he wants to know, the fault is not his. He goes through life respectable and respected; designs a large number of buildings with the aid of a good staff of assistants and perhaps some useful ghosts behind them; he does not meddle much with art, but he acts as a middleman between his employers and the carver, the glass painter, and other working artists, whose ideas he adopts as his own; he shows his interest in architecture as an amateur might by attending meetings and hearing papers on art of an archeological character, and after maintaining the profession he dies wealthy.

This is too true a description of many a "professional" architect's career in the past generation, and perhaps some to come; but we should deny that such a career has anything necessarily to do with the fact of having passed the Institute examination. Mr. Jackson and his friends seem determined to regard the examination as intended to reduce every one to a dead level, whereas it is simply a starting-point, and individual genius and character are no more dwarfed or interfered with than before. The whole picture appears to us to be an imaginary sketch of a "bogey" which does not exist, or at all events need not exist, in any such connexion. There is far more material for thought in the further portion of the essay. Mr. Jackson revives the view (it is not a new one) that it is far more important that architecture should cover the whole field of ordinary building—that every building should be architecturally interesting,—than that a limited number of great architectural works should be designed and built. There is a wholesome truth in this, but it is pushing it rather too far to say that to the rustic homes of England her beauty is far more due than even to her halls and mansions, and to speak of "the lovely fanes in which the life of English architecture pulsates even more strongly than in her Cathedrals." It is good to recognise fully the beauty possible in small churches and even in cottages. But is it really true or reasonable to argue that we could better spare our great cathedrals than our cottages? And in regard to the latter, does the author give full value to the influence of time and association in the interest they have for us? One of our cathedrals would be a glorious work if we saw it in fresh-hewn stone, depending only for effect on its innate grandeur. Would it be the same with the cottages if we saw them brand-new, divested of the touch of the hand of time? It is much to be doubted. The painter of to-day, it is true, is "never tired of painting them," but how much of his interest in them is owing to the manner in which time and weather have harmonised them with the landscape? The deduction presented to us, however, is that we ought

to direct more of our efforts toward raising the character of the every-day building of the country, the mass of building which are carried out by builders and where no architect is employed. Mr. Jackson thinks there is something pathetic in the way in which builders, left to themselves, strive to produce something that will pass for architecture, imitating the style of some architect who has gained a reputation: "a bit of stone, a Gothic capital, or a terra-cotta plaque, in situations for which they are quite inappropriate, are necessary to their happiness. In a sense it is pathetic, but not quite in the sense here suggested. Mr. Jackson seems to think that these architectural efforts on the part of the builders spring from a desire to be artistic. It would be pleasant as well as "pathetic" to think so, but we fear it is nothing more than a persuasion that better rents can be got from houses which make some pretence to be architectural. It is nothing more than a matter of trade; and it is surely rather paradoxical that Mr. Jackson should be so contemptuous towards the architects who think chiefly of making a living, and so indulgent to the builders who only do the same thing in a still worse way.

We fear this is only a sample of the feeling that runs through the whole volume: anything, even a jerry builder, is better than an Institute architect. Mr. Jackson goes on, in a very eloquent passage, to suggest that it would be a really great work if the Institute would endeavour to teach the everyday builder to do something better; but he says, "We may imagine the shock such a proposition would cause in Conduit-street." We believe there are plenty of people "in Conduit-street" whom the proposal, in the spirit in which Mr. Jackson makes it, would not shock in the least; but they would perhaps ask the question, which he leaves unconsidered—how is it to be done? How are the builders to be taught? And will they come and be taught? And what machinery has the Institute at its command for such an undertaking? There is a more practical tone in the suggestion that young architects who have not any immediate prospect of success in the usual way, should go into partnership with builders and give them the advantage of their superior taste and attainments. As he says, "there need be no social descent in this. The day is happily come when a man is judged more on his own merits than on the accidents of his position." We believe there are cases in which this kind of partnership has been carried out; but it necessarily all depends on the builders who have the capital, and the advice should rather have been addressed to the builders, who "have the call," as one may say, than to the young architects. And the latter would find in almost all cases that their "superior taste and attainments" were valued only in proportion to their power of bringing in money to the firm; hardly a very dignified or desirable position. Mr. Jackson's summing up is to the effect that the Institute should cease to be an Institute of Architects and become an Institute of Architecture, that it should found a great National School to which every one connected with building could have access, that it should "think more of the good of architecture and less of the profit and position of the architect, and, throwing the dignity of the profession to the winds, set itself seriously to the task of raising building throughout the country once more to the level of an art." This is unquestionably a noble programme, "worthy," as Mr. Jackson says, "of every society"; but in regard to the founding of the National School the Institute has neither machinery nor funds for such a work, which could only be done by public money; and as to the latter exhortation, there are not a few men, and those the best and most able, in the Institute, who would sympathise in every respect with the views here propounded, who have no unreasonable views about "professional dignity," and desire good architecture before every thing

* Signed "Epictetus," and printed in the *Builder* for December 26, 1891, pages 453-9.

ise; and surely Mr. Jackson would have done better in helping them than in throwing stones at them all indiscriminately, merely because they belong to the hated Institute.

Mr. Micklethwaite's chapter on "Architecture and Construction" is a very good one, though the truths in it are not very new, and he gains surely exaggerates in his pessimism in saying that "many" of the "eminent architects" are well known to be practitioners in building, "or completely without knowledge of architecture that they cannot direct the draughts-men whom they employ." There are such persons we believe; but surely "many" is one of the exaggerations which are continually rapping up in the pages of this enthusiastic and not very logical volume. And it is a serious thing to throw out exaggerated statements of that kind to a public which is only too ready to accept them. Mr. Micklethwaite is absolutely right in saying that "if our towns are ever to become what they ought and ought to be we must make the public wish to have them so." We have said this over and over again, and some of the writers in this volume speak as strongly on this point, but here again they are at variance with Mr. Norman Shaw, who declares that "what the public want is good architecture, buildings which would interest them and afford them real pleasure, and which would be a daily source of that delight which beautiful architecture has always excited among intelligent human beings." Here is optimism indeed! We can only say we heartily wish it were true. Our sadder conviction is that the great public of this country care nothing whatever about architectural beauty. It is quite true, as Mr. Shaw says, that no enthusiasm can be raised by mere professionalism, or the parade of being "practical men." But the English public do not want their enthusiasm raised: they have, in regard to architecture, no enthusiasm to raise, and as for baring about the difference between art and 'professionalism,' most of them do not even understand in what it consists. That is just one of the great difficulties in the way of the improvement of our national architecture, and others of the contributors to the volume fully recognise.

If the reader endeavours to gather from this volume a general conception of what the writers consider an architect is or should be, he will find them not quite in agreement there either. Generally speaking the favoured view is that of the architect as Master Builder or master craftsman, the "Medieval" view, as we may call it. The architect should be much more on the building than he is; and the idea is renewed again that if we would only give up drawing and work with our hands there would be a revival of real architecture. This is a wholesome and a manly ideal; better no doubt than that of sitting in an office and writing letters; but it is a question, in the first place, whether it is not Utopian under present conditions of life, and in the second place, whether it is after all an essential condition to the production of the finest architecture. It is the Medieval, but not the Greek theory; from the manner in which the Greek buildings are designed it is obvious that they must have been thought out and drawn out first; and Greek architecture is, in refinement at least, at the top of all architecture we know of. Mr. Norman Shaw here again differs from the prevailing view of his colleagues, and we think with more truth. "Who ever heard," he says, "of a clerk of works being an authority on architecture. . . . It is the architect we want, the man who has in addition to all necessary practical knowledge the power of design." Mr. Basil Champneys also, whose essay on the "Relation of General to Technical Education" contains some admirable remarks, says that "the relation of the architect to his subordinates is more or less that of a Minister to a Department of State, and that he is not the most effective minister whose mind is most possessed of technical detail." Mr. Jackson "charges" in directly the opposite direction, and wishes

the architect to be practically a kind of clerk of works; and Mr. Lethaby, in his essay on "The Builder's Art and the Craftsman," hints that the artist connected with various crafts will probably not much longer consent to submit to "the dictatorship of the organised and organising architect." If this means anything, it means that each artist on the building is to have a free hand and follow the dictates of his own feeling. Nothing could be worse for the total result. It has been tried at the Pantheon, where the first French painters of the day have done each as he pleased, in the decoration of the building, with a result of ghastly incongruity; and to let all "crafts" artists have their own free hand independent of the "architect" or chief builder would produce the same kind of incongruity. In fact, this idea strikes at the root of all architectural design in the true sense. Another point we must notice in Mr. Lethaby's essay is his remark about a profession "which discourages architects approaching work nearer than in the capacities of agent and draughtsman," with the reference, "see *Builder*, December 19, 1891, p. 459." As we knew we could have written nothing of the sort, we turned to the passage with some curiosity, and find the reference is to a paragraph about a Furniture-making Society of which Mr. Lethaby and other architects are members, in which we suggested that it was exceedingly illogical for architects to be in the position of recommending their clients to purchase furniture from a commercial company of which they were members, and that the rule of the Institute which forbids its members from having any commercial interest in materials and manufactures connected with building is a sound one. We never said one word against architects designing furniture for their clients, only against their having a commercial interest in the sale of it. We presume that Mr. Lethaby does not appreciate the distinction between what we really said and what he implies that we said: but the public who are the architects' clients will be quick enough to perceive it.

Thus the authors are in no accord with one another as to what an architect is, and they have further complicated the subject by calling in the assistance of a painter, Mr. Richmond, who makes the usual kind of assertion we hear from painters nowadays, that a man who can delineate the beauty of the human form can do anything in art, "he can design a picture, make a statue, or build a cathedral." Mr. Richmond admits that this is a startling assertion, but says "it has been proved over and over again to be true." We should have thought the contrary had been proved over and over again. Michelangelo made a constructional failure of St. Peter's dome, which Raphael had previously confessed to be absolutely too much for him. There is scarcely a painter before the public who can draw architectural detail correctly; sculptors cannot make a decent job of the mouldings of a pedestal for their own works,—in France this is so generally recognised that they always join an architect in the commission; and Stevens's Wellington monument, a rather exceptional example, is to some extent spoiled by bad mouldings and weak decorative detail, which no one who had thoroughly studied architectural design would have been content with.

The memorialists complain that sculpture and architecture have been divorced. We do not think they ever were one, but we think architecture and engineering once were, and that the real mischief of the day, as we have long ago said, is that we have two classes of constructors, when we ought to have only one, and ought to see every work of engineering a work of architecture also, and every architect capable of building a viaduct as well as a street house. That alliance would do more to raise architecture than for architects to aim at being sculptors, which they cannot be, to any purpose, without neglecting their proper work; the two arts are entirely different in their process and conditions, and a man who tries to do

both is only likely to be either a poor sculptor or a bad architect.

There is a great deal in this hook with the spirit of which we cordially sympathise, as long as the writers keep away from the polemical matter which has been, unfortunately, the moving cause of the production of the volume. Whenever they get to that, they are nearly always unfair or paradoxical. No doubt the flag of examination has been flourished too much by the champions of the Institute, and it is open to question whether the same result of keeping up the standard of membership could not have been attained without an examination test, as it is in the Institution of Civil Engineers, a body which every engineer finds it almost necessary to be a member of, on pain of being regarded with doubt as to his professional acquirements. On the other hand, as we have already pointed out, an examination programme is calculated to give an exceedingly useful indication of a line of study for young students, the value of which some of them have already acknowledged, and it was certainly founded with the best intentions. But the temper and tone with which this well-meant effort is spoken of in the hook before us is really too absurd for serious consideration. To tell people that a Society which has instituted a test examination in architectural training is "doing its best to degrade the art of architecture," and has "aimed a dangerous and invidious blow at architecture itself," is going beyond all the bounds of reasonable criticism. It is remarked that "if in England architecture is to regain the place which in France it has never lost, it must be by the effacement of its professional character;" while the fact is that the French "Société Centrale" is to the full as professional a society as the Institute, and that numbers of French architects are now demanding a Government diploma for practice, of a much more exclusive kind than anything which the Institute has proposed.

It is complained that "business proficiency" is a new element not recognised in the Institute Charter; but the Institute here again is on the same lines with its French neighbours, who have recently advocated the establishment of a professorship of architectural account-keeping in the Ecole des Beaux-Arts itself. One writer picks out an advertisement which we published by a person calling himself "A.R.I.B.A." who advertised for business, and adduces this as an instance of "the use to which the Institute diploma will probably be turned." The case was, as any one might see, a purely exceptional escape of an unprincipled person, who had really been struck off the Institute rolls some time before. Is this what can be called fair fighting? It is asserted that the public have never demanded protection from incompetent architects. We presume people who say so have never read the *Times*, which is an adequate expression of average public opinion, for twenty years back, or they must know the contrary. We do not say average public opinion is right in its view; the public may perhaps be better protected in other ways; but the fact that it has made the demand is incontestable to those who read newspapers. In fact the public, if they do not care for architecture as an art, at all events see that, however much it may be an art, it is one complicated with questions of safety and healthfulness of construction, which cannot safely be left in the hands of any and every one who may feel an ambition to express his artistic soul in architecture. Another contributor to the hook, again, objects that asking a candidate for a design will only show one example, "whereas an architect has to be able to design for all legitimate occasions." Of course; but one design will probably show whether he has any notion of handling design and expressing it on paper. Another writer points out triumphantly that it is quite possible for a man to write "F.R.I.B.A." after his name, who is no more than an estate-agent and a collector of rents. It has been possible, and that is the very

thing the Institute is now doing its best to prevent, and it is held up to odium for doing so!"

We half suspect that the real cause at the bottom of all this polemical fencing is to be found in the curious tendency in England which leads a few men, in other instances as well as this, to refuse all association with constituted bodies and maintain a position apart. Thus there are painters who always speak with contempt of the Royal Academy as a body which only works for the injury of art; and the older writers in this book are men who have always stood aloof from the Institute of Architects, and who seem to have used this question of examination as a newly-discovered stick to beat it with. And while we repeat that there is much about architecture in the book with which we cordially sympathise, and which members of the Institute would do wisely to read and consider, the polemical portion of it is mostly unreasonable and often unfair, and we are still of the opinion that the authors of these essays would have done far more for the good of architecture in England if they had joined in endeavouring to make the Institute of Architects the influence for good which it might be, instead of banding together to describe it to the public as a "bogey" barring the way to all future progress in architecture.

THE LIFE AND WORKS OF DR. WERNER VON SIEMENS.†

THE author of this work, an elder brother of the late Sir William Siemens, was well known in England, was the founder of the fortunes and reputation of the family. He was for some years in military service, distinguishing himself especially in scientific work; but about 1848 he left the army, and devoted himself entirely to scientific pursuits, chiefly in the domain of electricity. He established, in conjunction with Mr. Halske, a manufactory for electrical apparatus, which soon acquired very large dimensions, the firm growing famous for the number of valuable inventions and improvements introduced by them, as well as for the enormous amount and high quality of the work they supplied. But, independently of his connexion with this establishment, Werner Siemens became celebrated for his labours and researches in science generally, and many honours were conferred on him. In 1860 the University of Berlin gave him a Doctorate; in 1874 he was elected a member of the Royal Academy of Sciences, Berlin; he was afterwards created a Knight of the Prussian Order "Pour le Mérite" (the highest scientific honour in that country); and in 1888 he was raised to the rank of nobility by the Emperor Frederick III.

Being deservedly popular among the German people, a desire has been expressed that an account of his life and works should be published, and he has agreed, in the first place, to reprint his most important writings; and, secondly, to furnish materials for an account of his life and work, with a history of the renowned firm of which he was the founder.

A first volume of "Wissenschaftliche und technische Arbeiten" appeared in Berlin in 1889, and a second in 1891; a demand speedily arose for a second edition, and steps were also taken for their translation into English. That of the first volume is now before us. It is devoted to "Scientific Papers and Addresses," and forms a large octavo book of 450 pages, with a portrait

* Among other things we observe Mr. Jackson says that "Mr. Farrow, eminent as a 'coach,' has told us publicly that as a matter of architectural education the preparation for the Institute examination is perfectly useless (meeting of the Architectural Association, December 11, 1891)." As our report of Mr. Farrow's speech contains no such expression, we have referred the point to him, and he says explicitly that he never used such an expression, and that it does not represent his opinion.

† "Scientific and Technical Papers of Werner von Siemens." (Translated from the second German edition.) Vol. I. Scientific Papers and Addresses. London: Murray, 1892.

and many illustrative wood-cuts. It contains forty-two papers, some of considerable length. They begin as early as 1845; some of them are on subjects that have no general interest now, and others only treat of trifling matters of technical detail. We may select the following for remark:—

A paper, dated 1845, "On the Application of the Electric Spark to the Measurement of Velocity," mentions Siemens's work for the Prussian Government in the earliest successful attempts to introduce this method of measuring the velocity of projectiles; a method which has since received such a remarkable development, not only for gunnery experiments, but also for other measurements of exceedingly small intervals of time. He showed that by its means an accuracy of $\frac{1}{10000}$ of a second could be easily obtained; and he prophesied that the instrument might be used to measure the velocity of electricity itself. The electrical chronoscope has now become one of the most essential aids to scientific investigation.

The electric telegraph, in various forms, occupies, of course, much space. Two long papers on Telegraph Lines and Apparatus, dated 1850, furnish a full historical record of the extensive and valuable work done by the author and his firm at a very early period. Other papers on the duplex telegraph, on electro-static induction and retardation, on the velocity of transmission of electricity in suspended wires, on the conductivity of carbon, on the theory of electro-magnetism, and so on, comprehend such a mass of technical detail that it would be hopeless to attempt any abstracted notice of them.

The subject of submarine cables, which for many years excited so much interest in the public mind, and called for the earnest study both of scientific theorists and practical engineers, comes into notice in several papers. One was presented in 1860 jointly with his brother to the British Association, on a subject then much controverted, "The Principles and Practice of Testing the Electrical Conditions of Submarine Cables;" another, in 1874, read before the Berlin Academy, gave a history of Siemens's earliest subaqueous lines, followed by an elaborate mathematical investigation of the intricate problems arising in the operations of cable-laying.

Three papers in 1860 and 1866 contain discussions, largely mathematical, between the author and others on the production of a unit of electrical resistance, and in 1863 we find a notice of the preparation and distribution, by the manufacturing firm, of the unit proposed by Dr. Siemens, namely a column of mercury 1 metre long and 1 square millimetre in section at zero centigrade. The British Association took part in this matter.

In 1860 Dr. Siemens gave, in *Poggendorff's Annalen*, an account of some curious phenomena he had observed on a visit to the great Pyramid of Cheops. The weather was fine, and he, with some engineers engaged in laying the telegraph line in the Red Sea, ascended the pyramid, when, somewhat to the annoyance of the party, they found themselves caught in the peculiar dust storm known as the Khamsen. We may give his description of what he saw:—

Arrived at the summit we felt a sharp, cold wind blowing; the red of the south-western horizon was changed to a colourless clouding-over right up to the zenith, so that we could only observe near-lying objects in feeble outline. It was interesting to observe the sand of the desert, which covered the plain with an opaque yellow veil, continually rising with whirling motion higher up the pyramid. When it had arrived at the highest step we noticed a peculiar whistling noise, which I ascribed to the increasing violence of the wind; it was similar to that of surging water. We thought at first that the Arabs were uttering this sound, but I soon satisfied myself that it also took place when I stood on the highest point of the pyramid and held my forefinger in the air. There was also a slight pricking observable in the skin of the finger which was exposed to the wind. I could only explain this fact, observed by all of us, as an electrical phenomenon, and such it proved to be.

He then tried to establish this, producing with an extemporised Leyden jar strong sparks

and shocks, which made the Arabs believe he was engaged in sorcery. On further investigation he found that the phenomenon might be fully explained by the action of the sand which was the carrier, and probably the cause, of the electricity.

In 1866, he published an essay on "The Law of the Motion of Gases in Tubes," with a description of the pneumatic mode of despatch of messages laid down in Berlin. Everyone knows how much the electric telegraph system in London is aided by the despatch of messages in small tubes by pneumatic pressure. This system was applied by Siemens in Berlin on a much larger scale with tubes laid down in the streets, and this paper is an essay on the principles guiding the action.

At page 217 of the book is given a copy of a paper laid before the Berlin Academy of Sciences on January 17, 1867, having for its title, "Ueber die Umwandlung von Arbeitskraft in elektrischen Strom, ohne permanenten Magneten." This has become classical as the first publication of the great discovery by Werner and William Siemens of the principle of electro-magnetic augmentation and maintenance of a current without the aid of steel or other permanent magnets, the immediate result of the discovery being the production of one of the most wonderful of modern instruments,—the dynamo-electric machine, or, as it is now more briefly called, the *dynamo*. The German paper was followed by a corresponding one presented by William Siemens to the Royal Society of London on February 1 of the same year. The full history of the invention has been published in the English *Life of Sir William Siemens*.

Several papers in 1875-6-7 treat of the peculiar property of selenium, of conducting electricity better in light than in darkness. It may be recollected that Sir William Siemens in 1876 exhibited at the Royal Institution what he called a selenium eye, which was sensible to light and to difference of colour. The phenomena are here fully investigated.

A paper presented to the Berlin Academy in 1878 is called "Physical and Mechanical Considerations, suggested by the observation of an Eruption of Vesuvius in May, 1878." This observation led Dr. Siemens to some most elaborate speculations, which not only embrace the action of volcanoes specifically, but extend to the structure of the whole globe, and to the history of its earliest existence, with criticisms and remarks on the theories of Lord Kelvin and many other cosmical matters generally. It is impossible in regard to this to do more than refer to it as an exercise of deep thought and ingenious reasoning; and the same may be said of another paper of 1883, "On the Admissibility of the Assumption of an Electrical Solar Potential and its Importance for the Explanation of Terrestrial Phenomena," the title of which sufficiently indicates its general nature. A paper of 1882, "On the Luminescence of Flame," had for its object to settle some doubtful points on the source of light emanating from highly-heated gases.

At the end of the book are four papers, 1886 to 1890, "On Winds and Currents in the Earth's Atmosphere." The author says:—

"The interdependence of meteorological phenomena has been very closely studied by meteorologists during the last ten years. There exist on this subject an almost unending mass of observations, on which several ingenious theories have been founded. These deal, however, mostly with secondary phenomena, and rest therefore on narrow foundation. It would appear, indeed, as if modern meteorology had somewhat neglected, for these special studies, the investigation of the first causes of the observed phenomena. . . In the following pages it will be attempted to supply these deficiencies by the light of this doctrine of the conservation of energy."

The subject is thoughtfully and scientifically reasoned out, and the theory of the winds which the author arrives at is laid down in clear propositions.

It is customary, when a new member first attends a meeting of the Royal Academy of Sciences, for him to make an "Antrittsrede,"

or entrance speech; and we may give a few extracts from Werner Siemens's, as an example of the modesty of pretension which so often characterises true merit, as well as a somewhat ingenious form of allusion to the connexion of Science with practical occupations. He said:—

"The Academy, by admitting me among its members, has done me an honour which I have not sought, and was not entitled to expect. Up to now only those savants were called to these chairs, rendered venerable by the high scientific attainments of former as well as present occupants,—whose sole vocation was science, and who had successfully devoted to it the whole of their intellectual power. . . . The Academy, by choosing me, has deviated from this system; it has considered a man worthy to enter its ranks whose professional activity appertained neither to science itself nor to scientific teaching. . . . I am not presumptuous enough to think that the contributions I have made to pure science have alone been decisive for this. I believe, and I take comfort in the conviction, that more weighty considerations have influenced the Academy. I account for it by the circumstance that, thanks to better education and to the greater development of mental intercourse, scientific knowledge and method are now no longer confined to the narrow circle of the professional scientist, but exert their animating and fruitifying influences over larger circles of the community. They have been introduced as essential factors into the teaching profession, into official life, into the manufactures, into agriculture, even into most of the trades. Science is now, as it were, the nervous system which runs through the organism of human culture, which generates new life in its finest, hardly visible ramifications, and not only increases thereby the ideal good of mankind, but lightens the hard fight for material existence by pressing into its service the still unknown forces of Nature. To this last object of scientific activity my exertions have been always directed. My problems were generally prescribed by the demands of my profession, because the filling up of scientific voids which I met with presented itself as a technical necessity."

The second volume will contain technical and other papers on domestic and industrial progress at home and abroad; and the third will give an account of the author's remarkable life and career.

NOTES.

THE question which has arisen in the London County Council, namely, whether the Council shall do certain work without the intervention of a contractor, is of considerable practical importance. Theoretically, the Council has a perfect right to undertake any work without making use of a contractor, but in practice it is doubtful if the result will be satisfactory. Nearly all the railway companies, who are bound to do the best they can for their shareholders, put constructive work in the hands of contractors, and experience would thus seem to be against the Council, so to say, becoming its own contractor. A great deal of extra responsibility and work must be thrown on the officials of the Council, who will have to purchase materials, engage workmen, and so forth. "The proof of the pudding is in the eating," but we shall be surprised if, even locally, the ratepayers find any satisfaction in what may be regarded as a new departure if it comes to pass.

ONE of the arguments of the advocates of the eight-hours' movement is that the change would so far benefit the workers, physically, that they would probably produce as much in eight hours as they formerly did in nine. The opponents of the measure, whether prepared to grant this or not, need not seek to disprove it; for, if granted, it simply upsets another contention of the eight-hours men—that the reduction of hours would give work to the unemployed. But if either side care to avail themselves of it, they may adduce an argument bearing on this phase of the question from a statement made by a contemporary in discussing the miners' "stop day." After observing that the policy of restriction of output by means of a stop day has been pronounced a failure—a six-days

week having been quietly resumed at the beginning of this month—the result to the men and to the coal-owner is considered. Many of the former (especially those engaged in duties outside actual coal-getting) soon murmured audibly at being compelled to go about doing nothing, whether they liked it or not; while the coal-owner is represented as very quickly discovering that the weight brought to the bank was almost equal in the five days to what it had been in the six! It is curious to notice the different light in which the compulsory element in the eight-hours' day proposal is regarded by the miners of different counties. Mr. Cowey, President of the Yorkshire Miners' Association, has just declared that his society will tolerate no "local option" about the Bill, and that it should regulate all underground labour. Other bodies, which are at present inclined to bold aloof, would probably fall in line readily enough if the proposals savoured less of fetters; but they are preparing, not unnaturally, to jealously guard their independence. There is no doubt that a considerable amount of unanimity prevails regarding the demand in the abstract,—though even that is anything but complete,—but as to detail there is sufficient diversity of opinion to effectually wreck the Bill altogether.

A MEETING is to be held at the Mansion House on the 27th to assist in finding funds for the further "restoration" of Rochester Cathedral, which has no special fabric fund. The restoration was commenced by Sir Gilbert Scott a good many years ago, and it is now proposed that it should be continued under the direction of Mr. Pearson. From a circular sent to us we get an idea of the extent of the work proposed to be done. "A few years ago," it is stated, "the west front was found to be in a perilous condition demanding immediate underpinning and repairs. These are in a fair way of completion, and it is proposed to rebuild the upper halves of the two flanking towers destroyed about 130 years ago. The scheme includes the raising of the roofs of the choir and its transepts up to the gables which Sir G. G. Scott restored. It includes, also, works of reparation and restoration in the parapets and roof of the nave, in the interior of the aisles and transepts and elsewhere in the church." It is to be hoped that no more alteration will be made in the existing old work than is really necessary for substantial repair. To the rebuilding of portions of the towers which have been destroyed we have no objection to raise. The raising of the choir roofs to the line of the restored gables seems now to be rendered architecturally necessary, as the gables have been built; whether it was worth while to restore these gables is another question; but they are there now, and look absurd without the roofs, no doubt. But in this matter of restoration we seem always to creep on from one alteration to another, the last thing which was done affording a plea for going further.

THE contemplated improvements in the Strand will not be complete,—will, indeed, lose much of their value,—unless the access to South London by way of Waterloo Bridge is much improved also. To add more traffic to the existing east and west traffic of the Strand and Fleet-street, by opening a street from Holborn, will be to add to rather than to relieve the present block, and easier access to the bridge and to the Embankment is of the first importance, and should be provided before the proposed new street through Clare Market is made. This can be best effected by isolating Somerset House, by removing all the shops and houses reared against it on the Strand and east sides, and making a good street to the embankment by the side of King's College, and taking away the few shops on the Strand side and building up a new front in character with the rest of the building, setting back or rounding off the corner of Wellington-

street leading to the bridge. An alteration of this kind, carried out in the spirit of the alteration now going on at the National Gallery, would be an admirable improvement to both Somerset House and the Strand, and it would safeguard the building from fire, of which it stands at present in considerable risk from its contact with tumble-down property and the proximity to a theatre. Somerset House is at present occupied by Government offices, but with the concentration of Government work at Westminster which is going on from year to year, the building might in the course of a few years become available as a Town-hall for the London County Council, which has shown some desire to locate itself in the immediate neighbourhood. The proposal to build offices at the Strand end of the proposed new street from the north is open to question from an artistic point of view, as a high and large block of buildings (and even a wide street) near St. Mary's Church will dwarf the church and spoil its present charm, which is quite as much dependent on its surroundings as on its structural merits. If the County Council were to offer the Government to build a good and appropriate front to Somerset House on the Strand side it might provide itself with offices which would perhaps be sufficient for its present wants, and it might be able later on to buy out (by giving a site in Westminster or otherwise) the Government Department occupying the rest of the building. In this way the County Council would secure a Town-hall or Hotel de Ville worthy of the large and rich community it governs, and it would, at the same time, be relieved of the "itching palm" for the City Guildhall, which is so marked a feature of the programme of the more progressive members of the Council, and which for many reasons is not to be encouraged. In any case, good and indeed necessary improvements would be effected by such a course as we have suggested.

THE Head Master of Rochester Mathematical School, in a letter to the *Times* of Monday, utters some words of common sense which may well be borne in mind by those antiquaries who are ready to put the preservation of every ancient piece of wall before the most pressing needs of the present day. It appears that a well-known archaeologist had written to the *Times* about the "Vandalism" (the usual cant word) contemplated by the governors of the school, and stating that it was proposed to demolish a long length of the existing city wall, which was wholly unnecessary, as the dining-room which it was proposed to erect might be equally arranged in another place. The head master replies:—

"The only piece of the Medieval wall of which anyone in Rochester has taken any care is that in possession of the school. It is eighty yards long, and includes a very perfect corner tower. Of these eighty yards it is proposed to remove eight. The reason for removing this small portion is that it cuts obliquely across the ground upon which the governors are erecting, not a dining room, but a large three-storey building, with a depth of 36 ft., and a frontage to the East-gate of 100 ft. This building will contain a large school-hall, a gymnasium, and an extensive suite of science and art rooms. They are rooms which we have long wanted, and which the school has fairly earned, and they cannot be erected in any other position, all the available ground at the rear being already occupied with our class-rooms and other offices. It is practically a question of which is the most important to modern Rochester, a few extra yards of interesting but perfectly useless Medieval walling or a properly equipped higher modern school."

Mr. Brock appears to have been making the mistake so often made by the Society for the Protection of Ancient Buildings, of running a tilt against "vandals" before being sure of the facts; and the comparison made between the value of the old work to be removed and the objects of the new buildings to be erected suggests that more moderate and reasonable view of the claims of ancient remains, which archaeologists so often injure their own cause by ignoring.

THE Clerk-nwell Vestry propose to let upon a building lease the site of a quaint little tenement in Farringdon-road, on the eastern side of what was formerly Ray-street, being a parish watch-house, built in 1794, and so used during twenty-six years afterwards. The watch-house is, or was until lately, No. 18, and bears a slab with an inscription stating it is the property of the parish, 1835. A massively-built arch of brick under the shop floor covers the basin of the ancient Clerks' Well,—the *fons Clericorum* mentioned by FitzStephen in the description of London which he added to his account of the life of his master, St. Thomas à Becket. No. 16, adjoining southwards, marks the position of the pump which was fixed there in 1800, and against which they placed a memorial-stone setting forth that the well lay 4 ft. to the east.* In Radolph Agas's map, supposed to have been drawn in 1590, the Clerks' well is plainly drawn as pouring forth out of the wall of St. Mary's de Fonte nursery into a cistern or trough, which Stow describes as being "curbed about square with hard stone." The Parish Clerks, who here performed their scriptural plays, were incorporated in 17 Henry III, by name of the Brotherhood of St. Nicholas, and rank as the fifty-fourth Company of London. To them we owe a useful and now somewhat scarce volume, "New Remarks of London," 1732. The nursery pleasure covered the steep slope down to Vineyard-walk, Peartree-court, Hockley-in-the-Hole, and the hank of the Fleet, which in this quarter was called the River of Wells. In 1673, James, third Earl of Northampton, bestowed this spring upon the poor of St. James's parish. In later days they made a paupers' burial-ground, alongside of Ray-street, opposite the watch-house. That graveyard has, in turn, given place to local improvements, when the greater part of Ray-street was pulled down, in 1850-7, for the laying-out of Farringdon-road. Over its site passes the Metropolitan railway-line, opened from Farringdon-street to Paddington on January 10, 1863.

THE *Quarterly Review* contains an article on "Rapid Transit in London," compressing together a good deal of interesting statistical information. The *Quarterly* adopts the view that we cannot look for increased rapid transit in any way except by underground railways, overhead railways being obviously impossible in London as it now exists, while there can be no doubt that, even if possible, they are a serious injury to the houses near which they pass and a constant hindrance and inconvenience to ordinary vehicular traffic. The *Quarterly* therefore naturally sums up in favour of the projected electric railway schemes, by which it says the need can adequately be met, but with the serious question "whether they can secure sufficient traffic at remunerative rates, and work it with sufficient economy, to pay interest on the necessary cost of construction. . . . Capital will certainly not be forthcoming if each new undertaking is to be exposed to conditions of construction and of working more onerous than the last, still less if it is to be called on to carry a large proportion of its passengers at nominal fares, or to be threatened with the competition of rate-aided tramways" (a possibility which had been glanced at on a previous page of the article). We have already expressed a doubt whether the proposed tubes deep beneath the ground will prove an attractive method of conveyance, it may even be questioned whether the getting down to and up from them by the lifts will not waste a good deal of the time saved in rapid transit. We may have to learn that in a city like London, crowded up on old lines of narrow streets, there is a limit to getting about quickly which we shall have to recognise. But the article in the *Quarterly*, on a subject of so much public interest, is worth reading.

* We are informed that the spring still rises in a house close by to the west, and that they have to dispose of the overflow by pumping it away. On the high ground, at the rear, is Fox terrace.

WE do not know whether we are to take it as an example of the energetic policy of the new management of the *Pall Mall Gazette* that it annexed on Tuesday last a "Note" from this journal on Greek archaeological exploration, without a word of acknowledgment. If so, we may as well hint to that and other "enterprising" journals of the same kind that our objection to piracy of this kind, if persisted in, will not be confined to mere remonstrance.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

THE principal features in our report this week are the details of the two schemes which have been laid before the Commission,—one the utilisation of the Kennet valley for the construction of a large reservoir, involving the submersion of villages and the diversion of roads, a railway and a canal, and the other the construction of nine smaller reservoirs,—both projects being designed to maintain the flow of the Thames, while enabling the Thames companies to take more water from the river. The Kennet Valley scheme is proposed on behalf of the water companies, and the nine reservoirs scheme on behalf of the Thames Conservancy. It is understood that the Commissioners have before them a third scheme for a reservoir which will differ from the other two in not augmenting the flow of the Thames, and in being directly connected by pipes with the companies' filters. Before giving the details of the two proposals we conclude our summary of the

Evidence of Sir Frederick Bramwell.

Asked to state the considerations which guided him in taking 26 gallons per head rather than 32 gallons as the average of daily consumption, Sir Frederick said the New River Company was down to 28-26 for all purposes, and between 1855 and 1866, notwithstanding increase in population, that company reduced the quantity of water delivered. Then he was a director of a suburban company, sixteen miles head for all purposes, including road water; and it was a constant supply all day to houses with baths and gardens. He asked the Commission to infer that when the existing sources were economised it would be better to spend money in improved inspection than in new works. The New River would have to come down from 28½ to 26; the West Middlesex, from 29 to 26; the Southwark and Vauxhall, from a little over 28 to 26; and the East London would have to make a large reduction. This could be done without powers such as Parliament might be unwilling to give. The water fittings regulations were sufficient for the purpose, and the Lambeth Company, using waste-water meters, had found that they could effect reduction with existing powers. Asked whether, the people of London having been accustomed to consume large quantities of water, there would not be a difficulty in bringing down the consumption, Sir Frederick objected to the use of the word "consuming," and said that the people had never "consumed" these large quantities of water. They did not know that this large provision had been made for them. The waste-water meters showed how water was flowing away during the night while people were asleep; and there was an equal waste during the day; but people did not know of it. The waste arose from the original insufficiency or present condition of the fittings.

Would continuous inspection cope with continual wear of fittings? Yes; because waste-water meters would detect the 10 per cent. of cases in which it was necessary to interfere. He would not restrict the quantity of water to be taken; if a housemaid chose to take ten pails of water when five would suffice, let her do it, but do not let the water run to waste unknown to the consumer. London might be regarded as thoroughly provided with water-closets, but there was room for baths to increase with the desire for them in a class of houses where they did not have them now. The increased use of water on this account would

be large actually, but not relatively to the whole population.

With regard to the gravel supply of the Lambeth Company, leaving all legal questions out of account, it should certainly be regarded, as water taken on its way to the Thames, diminishing the flow at Teddington weir. A portion may make its escape below Teddington but the ordinary presumption would be that that quantity the flow is diminished.

In speaking of water consumption in the United States, the fact was sometimes overlooked that the United States gallon is only five-sixths of the Imperial gallon. In a district of the town of Charlestown, in the United States, the consumption per head was 4½ English gallons in the daytime, and in the night-time 32·6 English gallons. Deacons' meters were applied, and, after three rounds of inspection, the consumption per day was reduced to 22 English gallons, of which the night rate was 8·9, leaving 13 for the day, or half a gallon more than before. The whole saving came out of the waste that was going on day and night of water which never came into the hands of the consumer. In a report, the Charlestown Board complained of the consumption of 92 of these gallons daily, and said it had been their constant study to diminish this extravagance, and if the consumption could be reduced to 50 English gallons, the capacity of the works would be sufficient for many years. In a conversation about fittings, Sir Frederick expressed the opinion that London fittings were fairly good; but in the district of the East London Company he admitted that the Engineer, Mr. Bryan, had a terrible task before him.

The question was put whether hot-water apparatus was not a fruitful source of waste. Sir Frederick said that that waste was small, and it was due to the improper setting up of the apparatus. If it were set up with a lot of dead ends so that that which should be hot water stays when it is not being drawn off, and becomes cold, and you have to draw off a lot of cold water before you reach the hot, then that was a source of waste. This was much too common a sort of fitting, but it might be forbidden by law. What had to be done was to take care that you have your hot water on the run, and then you got it immediately without waste. In many towns hot-water pipes and baths were being put into houses of much lower rental than formerly,—in Edinburgh as low as rentals of 16*l.* and 18*l.*—and, of course, this must increase the consumption of water.

Asked what he would do in cases where taps were allowed to run all night on dirty clothes, he said he imagined the law could stop misuse of that kind; and, if it would not, the legislature would supply the needed remedy. He afterwards cited section 17 of the Act of 1863, which imposes a penalty of 5*l.* on any person wilfully and negligently wasting or missing water.

The Kennet Valley Reservoir Scheme.

Professor Henry Robinson, C.E., submitted to the Commissioners a scheme for appropriating the valley of the Kennet to a large reservoir and two small ones, with the object of ultimately maintaining a minimum flow of 500,000,000 gallons per day in the Thames by providing for the storage of 44,000,000,000 gallons. The plan involves the diversion of some miles of canal, the diversion of 10½ miles of railway, including three railway stations, and the submersion of several miles of public roads, two villages, and several private residences. The water could not come to London by gravitation, but must come down the river, the proposal being to discharge into the river sufficient to leave a minimum flow of 300,000,000, when the companies have taken 300,000,000 gallons.

In his statement the Professor said that he had been instructed by Messrs. Hollams, Sons, Coward, & Hawksley, on behalf of the London water companies, to submit to the Commission his views as to the possibility of augmenting the water supply of the metropolis by the conservation of the flow of the river Thames, when it was abundant, for use when it was not. It was possible to accomplish this and to effect an improvement in the river by constructing a reservoir in the Kennet Valley. The gaugings of the total flow are:—

	Million gallons per day.
The late Mr. John Taylor, 1853 to 1889	906
The Conservancy, 1883 to 1889	1,350

The former include long droughts; the latter

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 508; and current volume, pp. 10, 23, 47, 71, 82, 100, 120, 238.

accord with independent observations. On August 14, 1887:—

	Million gallons.
The minimum flow at Teddington was	153.9
The companies' abstractions were	101.0
Total, say	255.0
To maintain a minimum flow of	600.0
Would require a reservoir to hold	44,000.0

This would provide 300 for 10,000,000 of people at 30 gallons a head, and raise the minimum flow at Teddington from 153.9 to 300. The storage required is, according to Mr. Taylor's gaugings, 44,000,000,000 gallons; according to the Conservancy's gauging, 30,000,000,000 gallons. If there were no droughts greater than those of 1884, the proposed storage would keep the discharge up to 700, and give 100 more for the supply of the metropolis.

The witness proceeded,—"From an examination of the Thames Basin, I am of opinion that the Kennet Valley is admirably adapted to the construction of a storage reservoir of the required magnitude. The gathering-ground from which the River Kennet is supplied is very sparsely populated, and five-sixths of the area is on chalk, and, therefore, free from the action of floods in washing down polluting matter from the surface. The rainfall on this area is about 30 in., which is considerably above the average of the Thames Valley. The gathering-ground from which the Kennet reservoir would be supplied is 350 square miles. Owing to the high rainfall the average annual discharge of the River Kennet may be safely taken at about 0.1 on the entire gathering-ground, which would yield over 50,000,000,000 gallons per annum, or, say, 1,000,000,000 gallons per week. The average amount to be impounded per annum to provide for the maintenance of a minimum flow of 600,000,000 gallons per day would be ten weeks' flow, or 10,000,000,000 gallons, which is only one-fifth of the average annual discharge of the Kennet. This amount is derived from an examination of the gaugings of the river Thames from 1854 to 1889. The average time of the water-level rising in the reservoir would, therefore, be ten weeks per annum. During an average of twenty-two weeks per annum the reservoir would be overflowing. The regulation of the discharge would be carried on during the remaining twenty weeks. The plans and sections, which are appended, record in detail the data that I have obtained, upon which I have formed my confident opinion that a storage reservoir can be constructed in the Kennet Valley. This area is now being remapped by the Geological Survey, and Mr. J. H. Blake, of the Geological Staff, who is stationed at Reading, has seen the results given in my plans and sections, and agrees with them. It will be seen that the original mapping was incorrect. The Geological Survey Map, Sheet No. 12, and the Geological Survey Sections, Sheet No. 81, give what was supposed to be the geology of this area, but the section in the neighbourhood of Thattham, represents the chalk lying on an even slope, whereas recent well sections have proved the existence of a wave which is most conspicuous at Thattham, and extends several miles eastward. The error in the section at Thattham was apparently led to the incorrect mapping of the Reading beds all along the valley, from Beenham House to Thattham. The extent of the error reaches its maximum at the sharp bend of the valley near Woolhampton, where the base of the London clay is shown crossing the Bath-road, at a level of 220 ft. above Ordnance Datum, whereas the actual level at that point is about 138 ft. above Ordnance Datum (see Section No. 8), showing a vertical error of over 80 ft. The great point that has now been determined is that the basement bed of the London clay stretches right across the valley or about five miles, proving that the whole thickness of the Reading beds exists beneath, which establishes the watertightness of the bed of the valley. As the mottled clay of the Reading beds extends both up and down the valley beyond the London clay, the River Kennet runs over a clay bed for a distance of nearly eight miles."

The Professor submitted a plan on the scale of 1 in. to a mile, which showed the area between Reading and Newbury. The position of the reservoir is indicated by a line 230 ft. above Ordnance Datum, which represented the top water level of the reservoir. The upper chalk reaches Ordnance Datum, 1½ mile from the south-east side; the top of the chalk is 10 ft. above O. D. at the south end, 100 ft. at the north end. The bed of the Kennet, where

it crosses the site of the proposed dam, is 160 above O. D., or nearly 90 above the chalk. The strata of the 90 include 20 of alluvium and gravel, 40 of mottled-clay, and about 30 of irregular heddad sand and clay. A plan, 6 in. to the mile, shows in detail the positions of the out crops crossing the valley. The intervening portion is entirely a London clay. The Reading beds are from 70 ft. to 90 ft. thick. Above them exists a continuous bed of mottled clay, from 35 ft. to 50 ft. thick. This is the bed on which he relies to make the reservoir water-tight. Having described in detail a number of sections, he says that the levels of the chalk water in various wells afford conclusive evidence as to the continuity and water-tightness of the mottled clay. The Professor continued,—"The main bank of the proposed Kennet reservoir would be 1½ mile in length. The maximum depth of water in the reservoir would be 63 ft. over the bank of the river, or about 70 ft. to the river-bed. The top of the bank would be 235 ft. above Ordnance Datum. It would have a curved masonry and concrete wave screen wall along the water-side. The top of the wave-screen would be 10 ft. above the water-line. The bank would be 40 ft. wide at the top, with a public road along it. The slopes would be 3 to 1 on each side for a vertical distance of 20 ft., below which level the slopes would be flattened out to 4 to 1, bringing the bottom width out to 544 ft. at the banks of the river. The inner face of the bank would be covered with stone pitching. A puddle trench, having a maximum width of about 25 ft., would be carried down through the valley gravel, alluvium, London clay, and water-bearing Basement beds, and would be bonded into the main bed of mottled clay. The puddle tunnels extending along the water-bearing beds, as shown on the Sections Nos. 6 and 7, would be extensions of the puddle trench. The water-bearing stratum between the mottled clay and the London clay requires to be dealt with, and I propose to carry down the puddle trench under the main bank through it, and to bond the puddle into the main bed of mottled clay. From the north end of the bank a tunnel would be driven along this stratum up to a point where the top of the mottled clay reaches the proposed top water-level of the reservoir. This tunnel would be puddled throughout, by which the reservoir would be rendered absolutely water-tight on the north side. From the north end of the bank a similar tunnel would be driven a distance of about two miles in the direction of Sherborne St. John. The mottled clay only rises to the top water-level at a distance of nearly seven miles from the bank. The tunnel, however, need not be extended that distance to arrest any possible leakage. By constructing this two miles of puddled tunnel, any leak would have to travel round the end of the tunnel before it could reach the nearest outlet, and the distance it would have to travel would be about six miles. Taking the head in the reservoir at 60 ft., the hydraulic gradient could not exceed 10 ft. per mile. An examination of the springs from the water-bearing streak shows that the natural hydraulic gradient in this bed varies from 15 ft. to 40 ft. per mile. These figures have been arrived at by taking cases where springs are thrown out from the bed at a considerable elevation above the nearest low-lying outcrop, or by taking the difference of level of the water in two wells supplied by the same source. It follows from these facts that it would be impossible for there to be any appreciable leakage round the south puddle tunnel. The Upper Kennet reservoir bank would be one mile in length, with a waste weir extending 200 yards beyond. The width at the water-line would be 70 ft., with slopes of 3 to 1 on both sides, pitched with stone. The maximum depth of water would be 30 ft. on each side. The puddle trench would be carried down to the mottled clay. The road would be 10 ft. above the water, and would be carried over the weir on brick arches. The Euborne bank would be about 820 yards long, having a depth of 30 ft. of water on each side. The width of the water-line would be about 130 ft., the slopes being 3 to 1. This width is necessary to provide for carrying the canal and the road. The puddle trench would be carried through the alluvium into the London clay, which is about 60 ft. thick under the bank, and covers the entire area of the Euborne branch reservoir." The land to be submerged is, it is said, singularly free from hindlings. There are no chnches or

graveyards within the area, and only two villages would be interfered with,—Aldermaston and Woolhampton. The population disturbed would be 500 or 600. The Hungerford and Newbury Branch of the Great Western Railway passes up the middle of the valley. The necessary diversion of the line along the north side of the reservoir would be about 10½ miles, or slightly shorter than the existing line, and would not involve any sharp curves or steep gradients. The present stations of Aldermaston, Midgbam, and Thattham would require to be moved. The estimate includes the entire cost of the diversion, together with three stations, to be placed wherever the company may prefer to put them. The Kennet and Avon Canal, which now passes down the middle of the valley, would have to be diverted and carried along the side of the reservoir, with a flight of locks descending the hill near Ufton-green. From the south end of the bank the canal would be carried in one level reach (at or a little above the top water level of the reservoir), to Ham Lock, Newbury, crossing the Euborne Valley on a bank, which would be made water-tight to keep back the water in the Euborne branch reservoir. The users of the canal would draw all the water they require from the river as at present, before it discharges into the reservoir. The amount required is not likely to exceed 3,000,000 gallons a day.

The water supply of Reading is at present drawn from the River Kennet. If the proposed reservoir were constructed the flow of the river at the present intake would be interfered with, and a different supply would have to be provided. The population of Reading is about 60,000, so the amount of water required would be nearly 2,000,000 gallons per day, and it might be obtained from the gravel beds which overlie the chalk to the west of Theale, where the water comes up from the chalk, and would not require filtration. An alternative or supplementary water supply for Reading could be given direct from the Kennet Main Reservoir through a special pipe under the control of the Reading authorities. The amount required is comparatively so trifling that it would have no appreciable effect upon the general working of the reservoir. The volume required for the water supply of Reading and for feeding the canal would not exceed 35,000,000 gallons per week, or 3½ per cent. of the average flow of the Kennet.

The Bath-road would be diverted along the north side of the valley. The existing roads from Brimpton to Thattham and Aldermaston would be preserved by carrying them across the reservoir on the banks which retain the water in the Upper Kennet and Euborne Reservoirs. Two other roads would be carried across the Euborne Reservoir on Viaducts. All the roads leading from the hills to the valley would be connected by main roads along the sides of the reservoir.

In an account of the working of the scheme, Professor Robinson says:—"On the completion of the dam the regulation of the flow of the Kennet would commence. The basis of that regulation would be the maintenance of a minimum flow of 300,000,000 gallons per day at Teddington Weir. Assuming the amount drawn from the Thames for water supply purposes at that time to be 130,000,000 gallons per day, it follows that the function of the Kennet Reservoir at the outlet would be the maintenance of a minimum flow of 430,000,000 gallons per day, in the Thames above the water-works intakes. The storage necessary to accomplish this through the greatest droughts would be less than 10,000,000,000 gallons. The river Kennet, at its average rate of flow, would discharge this volume in ten weeks. If the reservoir sluices are closed for the first time at the beginning of November, and the discharge is regulated as stated, the reservoir would contain about 25,000,000,000 gallons at the beginning of June in the following year. If an extraordinary drought then occurred, the storage available would only be drawn upon to the extent of half or one-third. At the beginning of the second summer the reservoir would contain at least 35,000,000,000 gallons, and would probably be overflowing with 46,000,000,000 gallons stored. The outlet works consist of three tunnels in the London clay, each carrying a pipe 5 ft. in diameter, discharging into a large culvert, which would deliver into a gangang-basin provided with a weir constructed to measure the rate of discharge. The maintenance of a steady flow over Ted-

dington Weir all through the driest seasons would greatly improve the condition of the tidal part of the Thames. Between Reading and the waterworks intakes, the river would be improved to a still greater extent, as the flow would never be allowed to fall below 600,000,000 gallons per day after the reservoir had once been filled. This minimum compares with the 255,000,000 gallons per day already referred to as the minimum flow of the river recorded in August, 1887. It is clear that this increase would be of great advantage to the mill-owners, the barge-owners, the riparian owners, and the pleasure-seekers.

The following table gives the capacities, areas, and water-levels of the three parts of the reservoir, viz., 1, the Main Kennet reservoir; 2, the Upper Kennet reservoir; 3, the Emborne Branch reservoir:—

	1.	2.	3.	Totals.
Total capacity, million gallons	33,240	5,826	2,586	46,652
Available storage capacity, million gallons	33,000	5,620	2,500	46,100
Area covered by water:—				
At overflow level, square miles	0.95	2.75	1.30	10
At outlet level, square miles	0.5	0.25	0.05	0.80
Overflow level above O.D.	230	230	230	
Outlet level above O.D.	173	205	205	
Distance round shores, miles	11.5	7.33	11.2	

The areas that would be laid bare in the main reservoir by drawing off various volumes are as follows, the quantities being expressed in millions of gallons and square miles:—10,000—0.5; 20,000—1.0; 25,000—1.4; 30,000—2.15; 35,000—3.90. In an average year, only half a square mile would be laid bare out of an aggregate of 10 sq. miles of water, and this small area would be distributed over a length of 11½ miles of beach, giving an average width of under 250 ft. of beach laid bare. The excess of evaporation over the rainfall on the 10 sq. miles would be equal to about 2,600,000,000 gallons per annum, or about 5 per cent. of the average annual discharge of the Kennet. That had been stated to be 50,000,000 gallons, and it would be disposed of as follows:—

	Million Gallons.
Evaporation	2,600
Reading water supply	730
Feeding the canal	1,100
	4,430
Re-filling reservoir in an average year	10,000
Surplus	35,570
	50,000

In excessively dry years the total would be much less, and the deficiency is fully allowed for.

The cost of the scheme, with liberal allowances for compensation and cost of railway diversions, will not exceed 3,000,000, and the works could be carried out in three years.

Professor Robinson was examined at considerable length, particularly with reference to the efficacy of the puddle tunnels against leakage.

Mr. Binnie on the Proposed Reservoirs.

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Storage Reservoirs Proposed by Messrs. Marten & Rofe.

	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
	Drainage Area.	Mean Annual Rainfall.	Estimated Available Rainfall.	Capacity of Reservoir.	Compensation to Streams.	Available for Supply.	Top Water Level Above O.D.	Top Water Area.	Height of Embankment.	Length of Embankment.	Cost, including Land.
	Acres.	Inches.	Inches.	Millions Gallons.	Gallon per Day.	Gallons per Day.	Feet.	Acres.	Feet.	Yards.	£.
1. Windrush	60,701	32	11	7,811	9,959,000	53,268,000	429	1,454	54	1,230	633,000
2. Sherborne	3,463	31	10	500	2,148,000	Nil	550	284	30	367	60,500
3. Cherwell	14,000	28	7	1,900	9,020,000	12,320,000	410	620	49	728	238,000
4. Sor Brook	22,176	30	9	3,024	4,120,000	19,940,000	325	730	59	558	238,000
5. Swere	13,106	30	9	1,900	2,450,000	11,570,000	310	500	45	578	160,200
6. Deddington	8,450	30	9	1,158	1,580,000	7,820,000	295	400	40	515	117,400
7. Dorne	10,060	30	9	1,364	1,390,000	9,060,000	300	330	40	370	120,400
8. Glyme	17,900	30	9	2,358	3,250,000	15,730,000	300	330	45	323	104,400
9. Thame	8,128	27	6½	1,138	1,090,000	6,640,000	300	500	30	808	162,100
	147,644			21,149	28,466,000	136,388,000					1,773,000

The headings of columns 7, 8, 9, and 11 require amplification as follows:—
7. Compensation to the streams, being one-third of the available rainfall for 365 days.
8. Available to augment the supply of the metropolis over and above compensation-water named in column 7, for four dry months, or, say, 120 days.
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A Scheme of Nine Storage Reservoirs.

Mr. Henry John Marten, C.E., and Mr. Henry Rofe, C.E., as advisers to the Conservators of the Thames, submitted to the Commission a plan for the construction of nine storage reservoirs. They took the daily quantity of water withdrawn from the Thames at 90,000,000 gallons, though it had reached 101,000,000 and 107,000,000, and the flow past Teddington at 234,000,000 down to 151,000,000 gallons, concluding that, with few exceptions, it might be taken as exceeding 200,000,000 gallons. The problem was to double the greatest abstraction, 107,000,000 without reducing the flow below 200,000,000 gallons. This increase would not be exhausted for forty or fifty years, or thirty-three if increase in every other source were excluded. In the search for suitable sites for reservoirs they had been assisted by Mr. Henry Woodward, F.R.S., F.G.S., and Mr. Horace B. Woodward, F.G.S., both experienced geologists, the latter possessing great local knowledge; also by Mr. Thomas Franklin, F.S.I., land agent

The drainage areas, it is stated, are almost entirely of an agricultural character, consisting according to returns supplied by the Board of Agriculture, of arable land to the extent of 5 per cent., and of pasture to the extent of 40 per cent. They are sparsely populated, having on the average only about one person to five acres. It has been a matter of considerable difficulty to arrive at the estimated available rainfall. The mean rainfall being estimated at from 25 in. to 27 in., 16 in. has been adopted as fairly representing the average loss by evaporation and absorption. One sixth has been deducted for the average of three consecutive dry years. The aggregate capacity of the reservoirs will be about 20,000 million gallons, or double that of Lake Yrnwy reservoir, and the area will be double that of the lake with Lake Bala added to it. The puddle trenches can be sunk down to sound measures at reasonable depths. The works might be executed from time to time as they were required. No difficulty in construction is apprehended. All the sites are suitable, and where wing trenches may be found necessary they are indicated upon the sections. Flood water is greatly improved by storage in large reservoirs.



dington Weir all through the driest seasons would greatly improve the condition of the tidal part of the Thames. Between Reading and the waterworks intakes, the river would be improved to a still greater extent, as the flow would never be allowed to fall below 600,000,000 gallons per day after the reservoir had once been filled. This minimum compares with the 255,000,000 gallons per day already referred to as the minimum flow of the river recorded in August, 1887. It is clear that this increase would be of great advantage to the mill-owners, the barge-owners, the riparian owners, and the pleasure-seekers.

The following table gives the capacities, areas, and water-levels of the three parts of the reservoir, viz., 1, the Main Kennet reservoir; 2, the Upper Kennet reservoir; 3, the Ebourne Branch reservoir:—

	1.	2.	3.	Totals.
Total capacity, million gallons	33,240	5,826	2,536	46,602
Available storage capacity, million gallons	33,000	5,650	2,500	46,150
Area covered by water:—				
At overflow level, square miles	5.95	2.75	1.30	10
At outlet level, square miles	0.5	0.25	0.05	0.80
Overflow level above O.D.	230	330	230	
Outlet level above O.D.	173	205	205	
Distance round shores, miles	11.5	7.33	11.2	

The areas that would be laid bare in the main reservoir by drawing off various volumes are as follows, the quantities being expressed in millions of gallons and square miles:—10,000—0.5; 20,000—1.0; 30,000—1.4; 40,000—1.8; 50,000—2.2; 60,000—2.6; 70,000—3.0. In an average year, only half a square mile would be laid bare out of an aggregate of 10 sq. miles of water, and this small area would be distributed over a length of 11½ miles of beach, giving an average width of under 230 ft. of beach laid bare. The excess of evaporation over the rainfall on the 10 sq. miles would be equal to about 2,600,000,000 gallons per annum, or about 5 per cent. of the average annual discharge of the Kennet. That had been stated to be 50,000,000 gallons, and it would be disposed of as follows:—

	Million Gallons.
Evaporation	2,630
Reading water supply	730
Feeding the canal	1,100
	4,460
Re-filling reservoir in an average year	10,000
Surplus	35,570
	50,000

In excessively dry years the total would be much less, and the deficiency is fully allowed for.

The cost of the scheme, with liberal allowances for compensation and cost of railway diversions, will not exceed 3,000,000, and the works could be carried out in three years.

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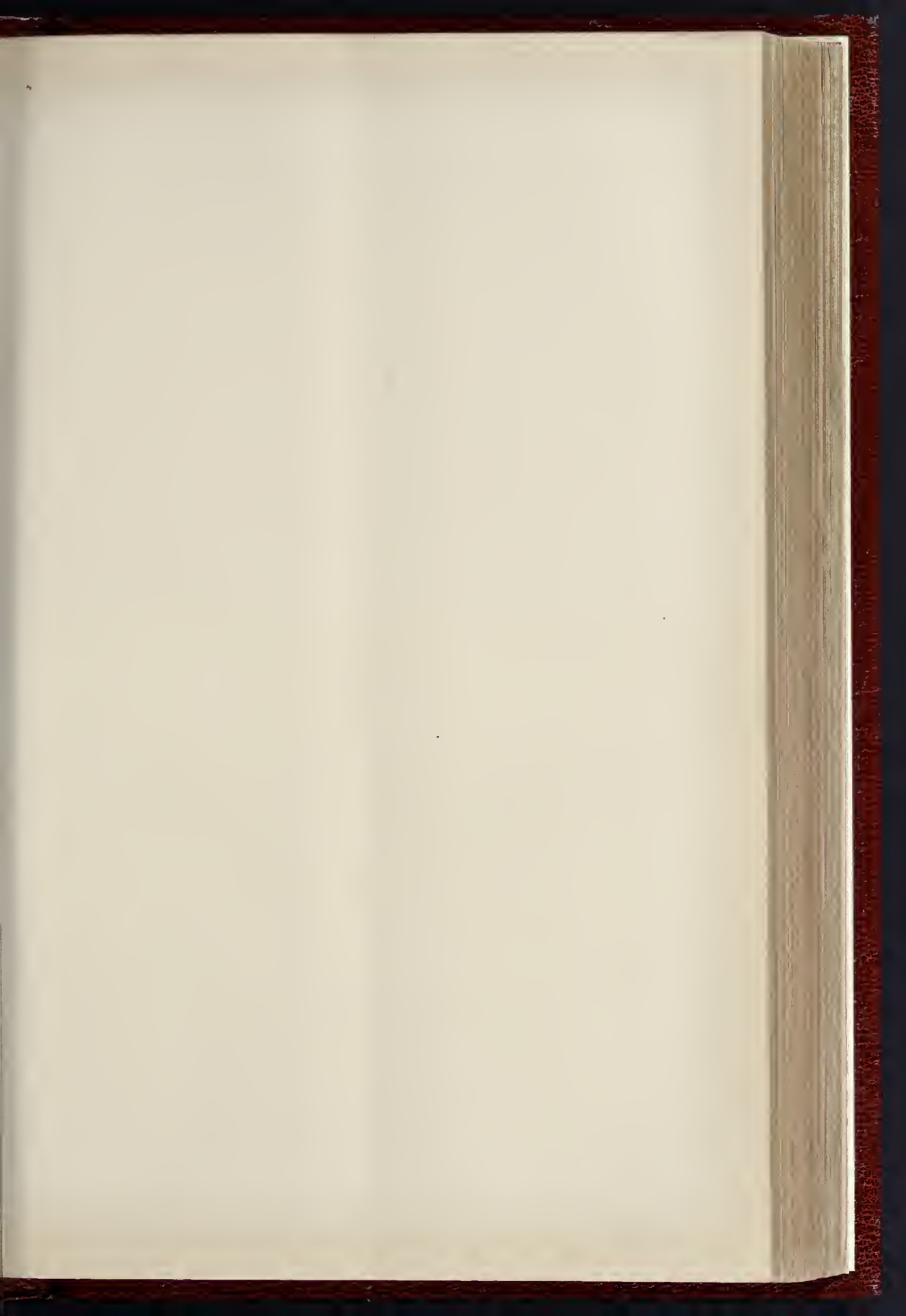
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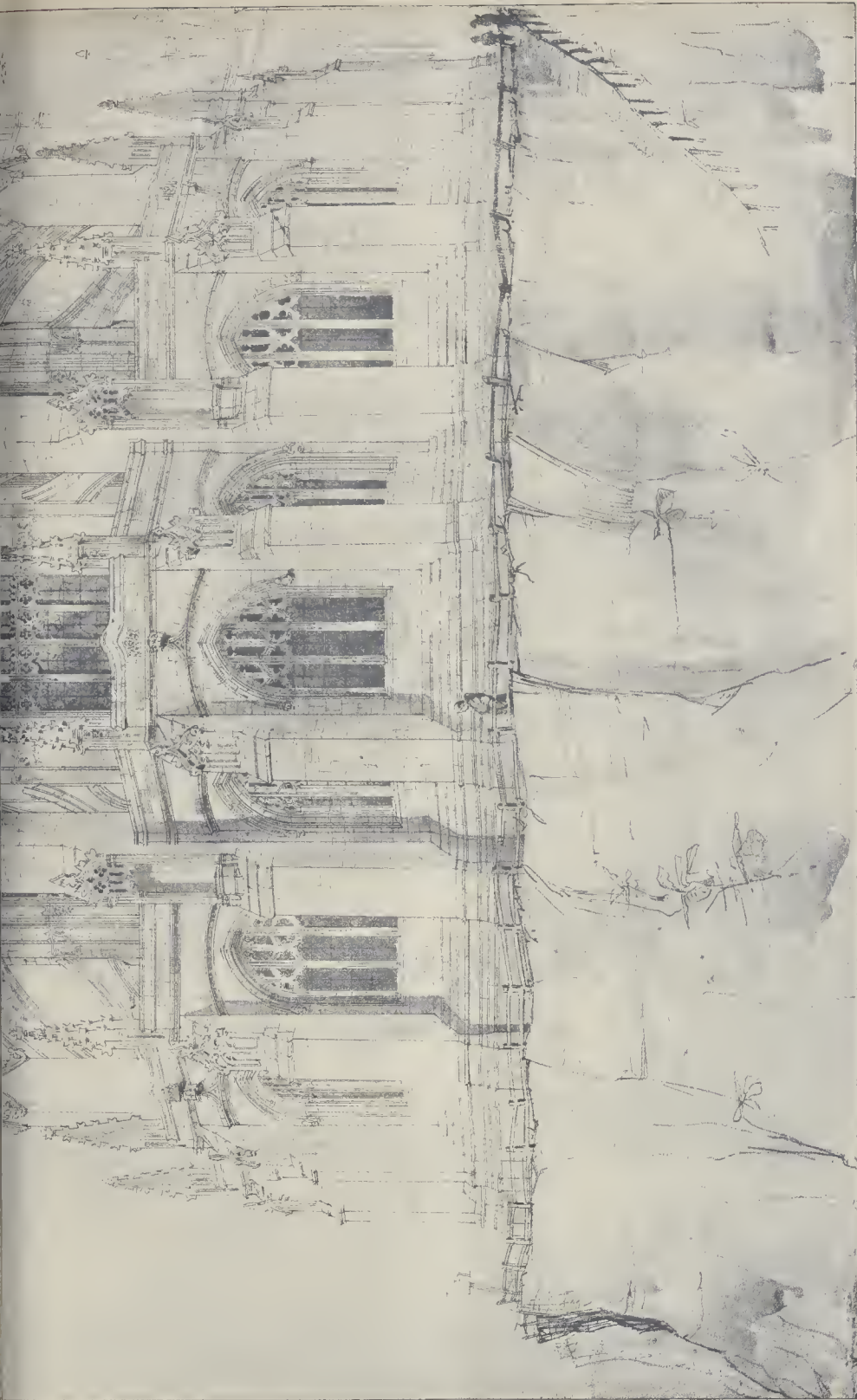
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THE GUILDER, OCTOBER 21, 1892.

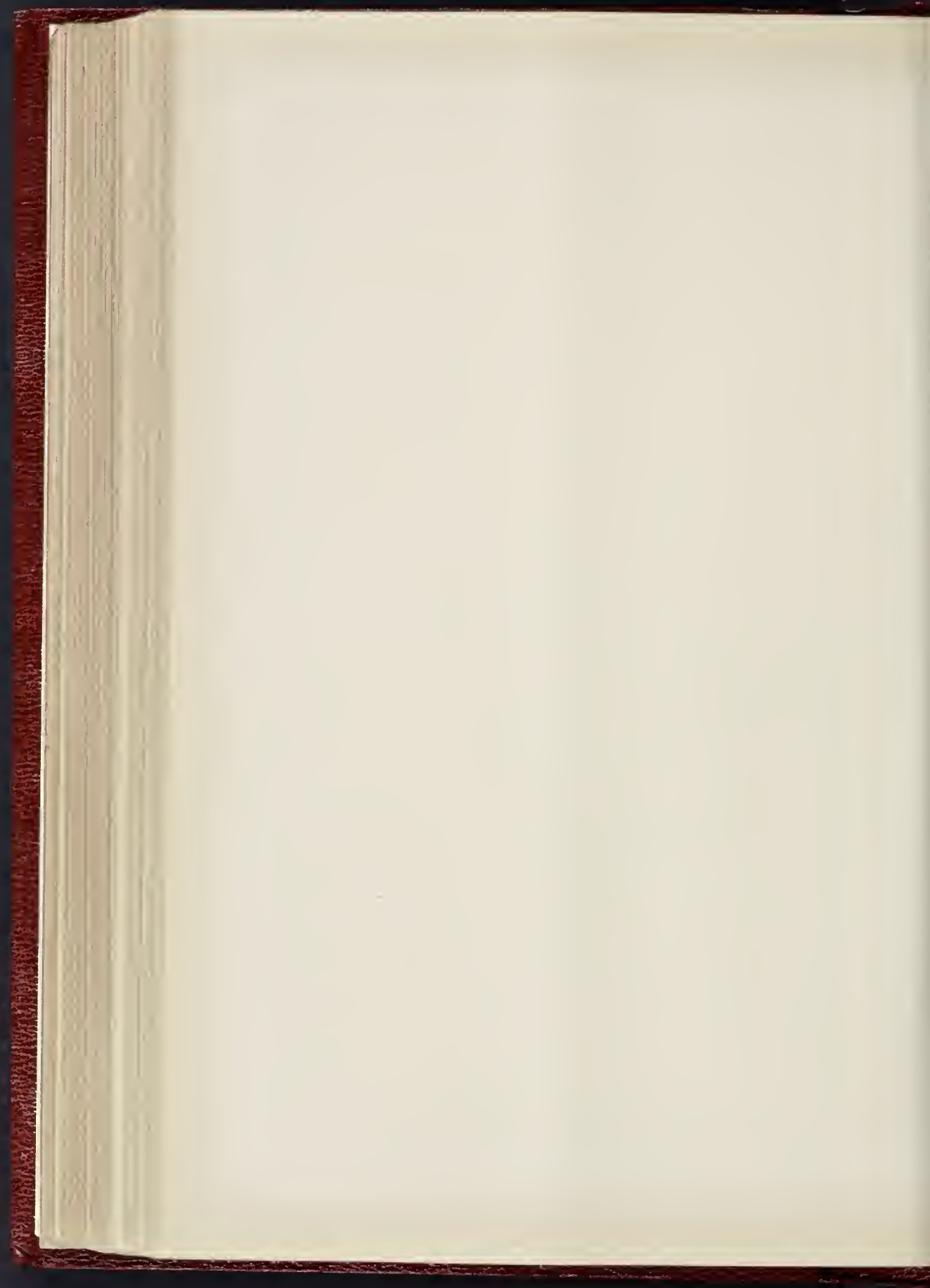




THE PHOTO. BRWA. IN. A.C. N. R. EAST. HAWKING. STREET. LETTER. JUNE. C.C.

DESIGN FOR A CHAPTER-HOUSE.—By Mr. HEBER RIMMER.

Some Medallion. R.I.E.A., 1892.
Royal Academy Exhibition, 1892.



f the water were passed down the valley of the Thames in pipes the scheme would involve much greater cost; and it was proposed that all the water should be sent down the open channel of the river. This would tend to keep the water in the river in active movement during drought, and it would also benefit navigation. The water would be aerated and oxidised in passing down the open channel and over and through thirty-eight weirs and water-wheels, with an aggregate fall of 184 ft. The sites for suitable reservoirs are by no means exhausted by these suggestions.

Mr. Marten and Mr. Rofe were examined at considerable length in explanation of this scheme. Mr. Marten said that he was a member of the Council of the Royal Meteorological Society, a Fellow of the Geological Society, one of the three statutory arbitrators under the South Staffordshire Mines' Drainage Acts, Engineering Adviser to the Board of Agriculture, and Engineer to the Severn Commissioners, to the Staffordshire and Worcestershire Canal Company, and to other public bodies. In the exercise of his profession he had made waterworks in various parts of the country, by which nearly 750,000 people were being supplied with water. Mr. Rofe said that he had been continuously engaged in the construction of large storage reservoirs. He was at present carrying out large impounding reservoirs for the Corporations of Wakefield and Burnley, and for the Leeds and Liverpool Canal Company.

The Supplies from the Chalk.—Mr. Binnie on the London Wells.

Mr. A. R. Binnie, Chief Engineer to the London County Council, was recalled and examined with reference to the list of wells he had formerly handed in. An index map and six sheets of vertical sections were exhibited, and the sections were plotted to a common datum. The lists showed for each well the date of visit, the locality, the depth, the surface level above or below Ordnance Datum, the present water level above or below O.D., the past water levels above or below O.D., and the gain or loss of water; and historical and other remarks were added with reference to each. Mr. Binnie's report was as follows:—

"During the past few months the Engineer has had a careful inquiry instituted into the past history and the present condition of 172 wells situated either in or immediately outside the boundary of the County of London. Of course, this in no way includes the wells of the Water Works Companies, information respecting which was not at his disposal. Accompanying his statement is forwarded for the information of the Commission the detailed result of this examination in a schedule attached. To illustrate the position of these wells, an index map on a scale 6 in. to a mile has been prepared, on which are printed black figures corresponding with those in the general list. It will be found that there are more numbers in the index map than in the schedule, as certain wells could not be discovered on the ground, or information was refused; but as far as the numbers in the lists go they are perfectly coincident. It will be noticed that in the lists the wells are divided into three categories, (1) those on the north side of the Thames within the County of London, (2) those on the south side of the Thames within the County of London, and (3) those on the north and south sides of the Thames outside the County of London. Besides this list and the index map, six sheets of vertical sections of these wells also accompany this statement. On these sections are plotted to a common datum under their proper numbers detailed information of each well as given in the list. The collection of these data has been a somewhat laborious and tiresome process, and the Engineer would wish that he was able to give to the Commission further important information, viz., the yield of water in the wells under review; but unfortunately the owners of most of the wells which are in private hands, for reasons which will be readily understood, refused to give him this information, so that he is unable to state to the Commission what quantity of water is obtained from these wells. What at once strikes the eye in looking at these well sections is the fact that the water-level varies very considerably in all of them, not only at different times, but in contiguous wells at the same period; consequently it would appear that the whole mass of the chalk under London is not entirely saturated, as is often theoretically supposed, to one uniform and constant level,

rising in a more or less steep gradient from the lower parts of the valley towards the point of outcrop of the chalk. Therefore it is a matter of some uncertainty at what level water may be struck in any proposed well, for it would seem that the water in the chalk is situated in or flows along fissures, so that well-sinking becomes more or less a matter of speculation; and when we notice that in the Index Table attached, that of the 172 wells 33 have been abandoned either through failure of supply or from other causes, we may conclude that, even when a supply is found, it is not always to be depended upon.

All these instances show a marked depression of the water-level in the chalk under London, which the Engineer considers to be a very important factor in dealing with this question. For if this depression exists it is difficult to understand how the water in the chalk area which lies in the Upper Colne Valley can flow to the south-east under London on its way to a discharge below the level of high-water in the Thames estuary. In fact, as it is well known that the chalk crops up in the bed of the Thames at or about Erith, the inference would rather be that a portion of the water of the Thames might, if a free course existed for it,

Summary of Results of Mr. Binnie's Inquiries into the Condition of Chalk Wells.

	No. of Wells showing Fall of Water Level.	No. of Wells abandoned		No. of Wells where Information was not available.	No. of Wells showing little or no variation of Water Level.	No. of Wells showing a Rise of Water Level.	Total.
		Owing to failure of Supply.	Owing to causes not specified.				
WITHIN THE COUNTY OF LONDON.							
North of the Thames.	45	8	17	23	11	1	105
South do. do.	23	4	3	13	7	3	53
Total	68	12	20	36	18	4	158
OUTSIDE THE COUNTY OF LONDON.							
North of the Thames.	2	0	1	3	1	0	7
South do. do.	5	0	0	0	1	1	7
Total	7	0	1	3	2	1	14
Total visited, 172	75	12	21	39	20	5	172

NOTE.—The rise of water level is due in one case (No. 13) to reconstruction of well. In another (No. 117) it is due to consumption being greatly reduced. The remaining three, probably through imperfect lining, derive most of their water from the sand formation.

Of the twenty wells showing apparently little or no variation, one-half are cases in which no failure of supply is admitted, and no sufficient data for comparison can be obtained. The remainder are probably affected by the infiltration of sand or surface water, and are possibly in some cases influenced by the tide.

It is a matter of history that in the earlier portion of this century, when artesian wells were first put down in the London basin, the water flowed almost to the surface of the ground. It is now, however, depressed very much below that level, as will be seen by the many records in the schedule. If the index table is examined, it will be found that of the thirty-nine out of the 172 cases, no information could be obtained; and consequently, for all practical purposes, we may base our calculations on the 133 wells of which information is more or less obtainable. Of these seventy-five, or 56 per cent., show a fall of water level; or 15 per cent., show little or no variation; thirty-three, or 25 per cent., have been abandoned either through failure of supply or from other causes; and in only five cases, or say, 4 per cent., has there been a rise in the water level. But in these latter cases there are grave suspicions that the rise of water level is not due to the chalk-water itself, but to the infiltration of water from the sand areas, or to imperfect construction, or reconstruction. Notes of these will be found in the table. If we add together, therefore, the seventy-five wells which show a fall to the thirty-three which have been abandoned, we arrive at the fact, that in all probability at least 81 per cent. of the 133 wells either show an actual present fall of water or an entire exhaustion of supply. The general fall of the water level in the chalk, although it varies very much, may be taken at about 1 ft. per annum. There is a marked area of depression in the neighbourhood of the City of London on both sides of the river, where the water level, as shown in wells (among others) 25, 26, 33, 34, 35, 133, 134, 136, is depressed to about 100 ft. below Ordnance Datum, or 123 ft. below Trinity high-water mark. From this point of depression the water level seems to rise, although in wells 73 and 75, at Chalk Farm and the Zoological Gardens, it appears to be depressed to 80 or 90 ft. below Datum; and at No. 77, at Webb's Mineral Water Works at Islington, it is 95 ft. below Ordnance Datum. No. 44, at Shoreditch Workhouse, is 87 ft. below Ordnance Datum. No. 68, at Messrs. Truman, Hanbury, & Co.'s Brewery in Spitalfields, it will be noticed that the water level is 239 ft. below Datum, and at St. George's Brewery, Whitechapel (No. 67), it is 171 ft. below Datum. The Royal Mint well (No. 24) is 98 ft. below Datum; and on the other side of the river we have the instance of Bethlehem Hospital well (No. 129) in which the water level has fallen considerably, and now stands at 126 ft. below Ordnance Datum.

flow down this gradient of 9 ft. per mile to supply the London wells. Certainly when we pass towards the east end of London and approach the River Lea, the water-level rises, although at wells 57, 80, 81, and 82, it would appear to be between 40 ft. and 50 ft. below Ordnance Datum; but if the expectations of the Engineers of the Water Companies as to the possibility of obtaining much additional water from wells in the Lea Valley are well-founded, the condition of things existing in that valley shows an entirely different state of affairs to that found subsisting within a few miles to the westward. The Engineer is not aware, nor has he ever heard it suggested, that there is any great fault or dislocation running north and south up the Lea Valley, which would account for such a favourable anticipation. No doubt an additional quantity of water to that obtained by the East London and New River Companies from their existing wells may be anticipated in the future; but the Engineer, with the large experience of the past fifty years, which the map, sections, and details placed before the Commission have rendered available, would hesitate much before basing any exact calculations on the amount actually to be obtained from any wells in the Lea Valley. We may anticipate in that valley an exactly similar state of affairs to that found to exist in London. At first, and for a few years, if pumping is carried on to any large extent, the water will be obtained at the expense of the water-level in the chalk, so that the wells will have to be deepened and the pumps lowered, as has so often been the case in London wells.

But we cannot entirely put on one side the possibility that the lowering of the line of saturation in the chalk under London may be due, at all events to some extent, to the interception by the wells already used by the water companies of the chalk water which would otherwise flow in a direct southerly course from the outcrop of the chalk near Ware, to the deep-seated wells in the centre of the London basin. The Engineer can only make this as a suggestion, and as one of the possibilities which must be taken into account in reviewing the somewhat obscure and confusing state of affairs. The Engineer understands from evidence placed before the Commission that the East London Company anticipate a total possible 22,000,000 gallons a day which can be obtained from chalk wells, and the New River Company look to a like 23,500,000 gallons, making a total of 45,500,000 gallons a day at some future time. This, in another part of the evidence, he notes is stated as 44,000,000 gallons a day.

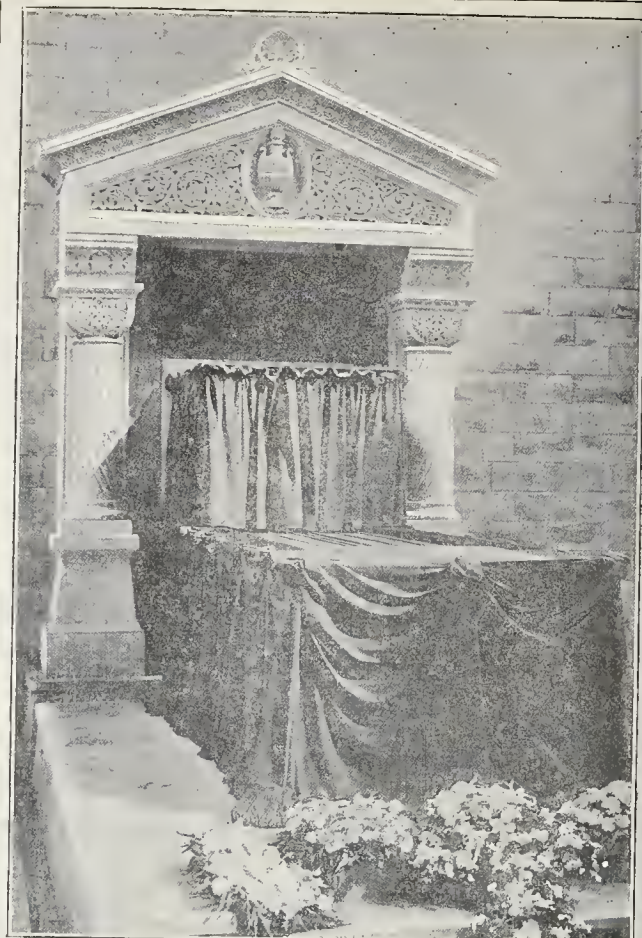
Engineer is unacquainted with any case in which water is pumped to this amount for the supply of any town in any part of the world, from so limited an area, either in the chalk, the new red sandstone, or any other formation; and he feels certain that, if it be attempted on such a scale as this, the most disastrous results must arise in the upper parts of the valley, as he anticipates that almost all the existing sources of supply would be more or less dried up. There are two important factors that should be determined before the possibility of pumping this large quantity is admitted: (1) Some approximate idea of the velocity at which this large underground river is flowing, and (2) a clear demonstration that it breaks out at some point or points in anything approaching the volume here spoken of. For it must be remembered that 41,000,000 gallons a day represents a stream of considerable dimensions, the flow of which, if it flow at all, should be capable of some exact demonstration. Nearly all the wells on the various sections, with the exception of No. 171 of the Richmond Water Works, are of the ordinary chalk type, going down for the purpose of obtaining water from that formation; but a few instances exist of attempts being made to obtain water from the greensand formation in the London Basin.

The Commission has already had placed before them an account of the failure of the Hampstead well of the New River Company. The Kentish Town well, an account of which, written by Mr. J. Prestwich, F.R.S., the Engineer will lay upon the table, has also turned out a failure; and the deep well at Richmond (No. 171) has not proved very successful, although sunk to a depth of 1,430 ft. below Ordnance Datum. The water level, after the pumps had been at rest for a fortnight, was about 133 ft. below Datum, and during pumping falls to about 213 ft. below Ordnance Datum. Attempts are now being made to improve the water-supply by connecting this well with a neighbouring chalk well, which is carried down to only 127 ft. below Ordnance Datum—that is to say, so poor is the supply derived from a well 1,430 ft. below Datum that it is about to be supplemented by a well 127 ft. below Datum, the 1,000 ft. of extra boring being sacrificed.

The late Metropolitan Board of Works sank two wells for the purpose of supplying their Crossness pumping station. The depth of the older well was 944 ft. below Datum. The lower portion of this well had to be abandoned owing to an accident. The new well is 1,000 ft. below Datum, the bottom of the shaft being situated at 55 ft. below Datum. The water-level in this well stands at about 64 ft. below Ordnance Datum. A section of the well, with a report on the subject by Sir Joseph Bazalgette, will be handed in by the Engineer. From the old well about 20,000 gallons a day are obtained, and from the new well 40,000 gallons a day, but the water is not of good quality. From the chemical analyses attached to Sir Joseph Bazalgette's report, especially that of Dr. Odling, dated September 8, 1868, there are grave suspicions that all those deep wells which go down into the chalk in the neighbourhood of Erith have some subterranean connection with the river, as they give signs of containing an undue amount of common salt. From the experience gained from the Crossness wells and others near the river on its Kentish side below London, it would appear that no large quantity of chalk water flowing from the south towards the Thames Valley can be intercepted on its way to the supposed outfalls or springs in the head of the Thames.

In 1878 the late Metropolitan Board of Works proposed to obtain a supplementary supply of water for London from chalk wells. The Engineer's predecessor, Sir Joseph Bazalgette, C.B., was assisted by the best engineers and geologists of the day, among whom may be mentioned Sir Frederick Bramwell, bart., F.R.S., W. Whitaker, F.R.S., and E. Easton, M.Inst.C.E. The result of their very careful investigation was that they discovered that they could only depend upon a quantity of about 30 million gallons a day in the vicinity of London."

In reply to the Chairman, Mr. Binnie said the inference he drew was that well-sinking in the London area must always be more or less a matter of chance, and, secondly, that the water when met with flows in certain definite but undefined lines underground, either in fissures or in some other way. On the evidence he contended that there had been a general



Manchester Crematorium: Canopy of Bier-Stand.

See p. 321.

fall of about 1 ft. per annum since 1850 in the water-level in the chalk under London. The level of saturation was 52 ft. lower in some cases, and in others more. His general inference was that the available water in the immediate London basin of the chalk was becoming exhausted. This might possibly be due to the pumping of the companies, in the Lea Valley, for instance. Many owners of wells had been reluctant to give information as to the amount of water they had taken, as they had a fear lest it should be divulged, and they felt they were drawing from a common source. He disagreed with Mr. Baldwin Latham as to the additional water to be had from this source. If you pumped more water from the wells you might dry up the upper streams which go into the river in dry weather.

To Mr. Hill: His opinion as to the amount of water available from the chalk was necessarily very vague, as anybody's must be.

To Professor Dewar: He was dealing with a circle six miles in diameter, and a radius of three miles from the centre of London. The whole depression could hardly be extended over the pumping of breweries, because it extended over a large area and to so great a depth. The suggestion that the water might be taken by the pumping in the Lea Valley involved the assumption of an underground conduit.

We hold over for want of space this week a report of evidence given by Sir F. Bramwell and Professor Robison on the subject of supplies from the chalk; and the immediate interest attaching to definite proposals for the construction of storage reservoirs compels us

to pass over for the present the more general, although practical and important evidence of Mr. Baldwin Latham, Mr. Peregrine Birch, and other witnesses.

The Commission held a sitting on Wednesday last, when the following geologists were on the list of witnesses:—Mr. W. Topley, Mr. A. B. Woodward, Mr. R. Etheridge, Professor W. Boyd Dawkins, and Dr. H. Woodward.

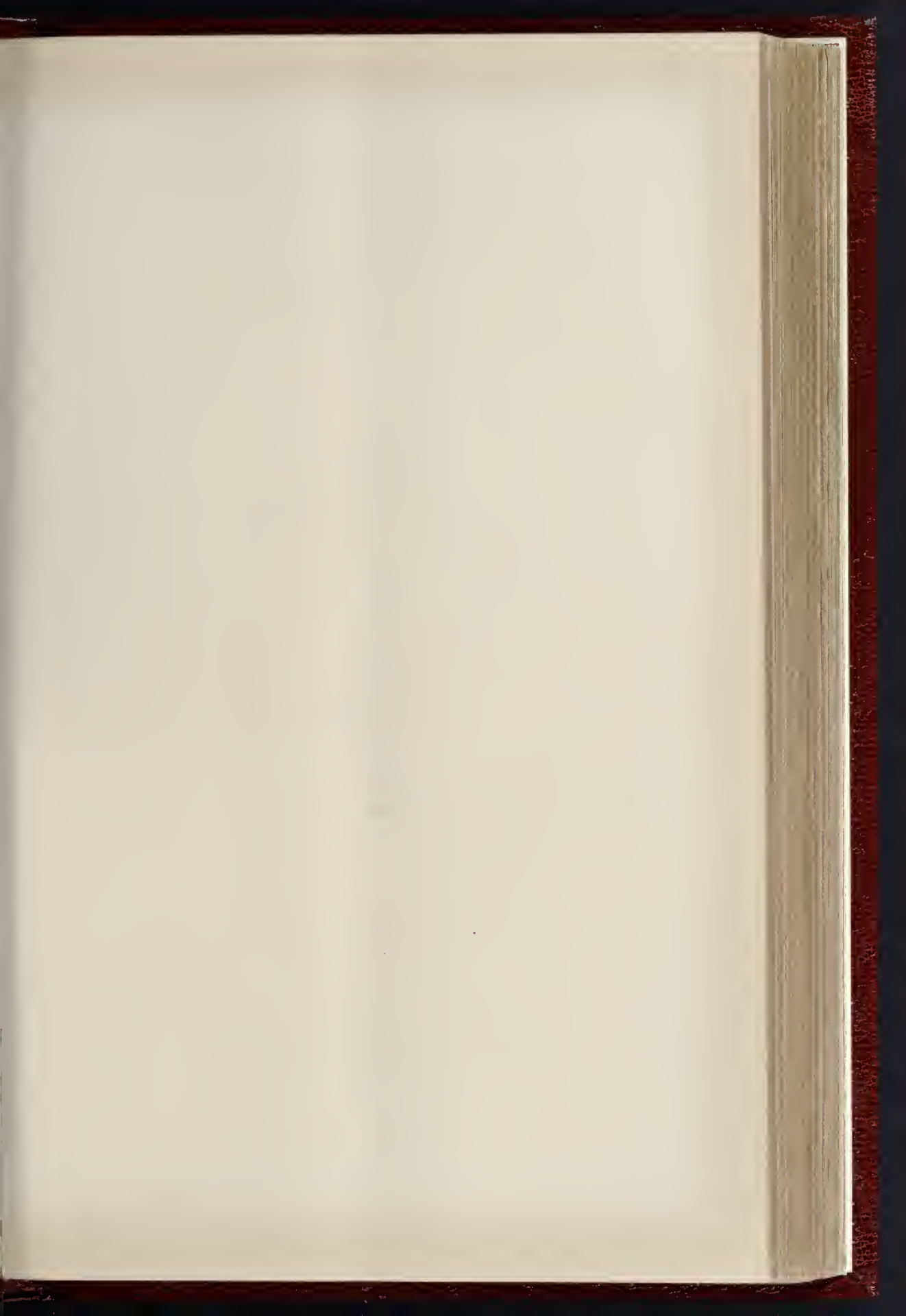
Illustrations.

DESIGN FOR A CHAPTER-HOUSE.

HIS is the perspective view of the design to which the Institute of Architects awarded the Soane medal this year, the author being Mr. Heber Rimmer, of Chester. The drawing was hung in the Architectural Room of the last Royal Academy Exhibition. The author says:—"In this design an elevated site was supposed, and an open cloister carried round the chapter-house in order that the Dean and Chapter, or Abbot and Monk as the case stands, may have the advantage reserved to themselves of the prospect such a sight might command.

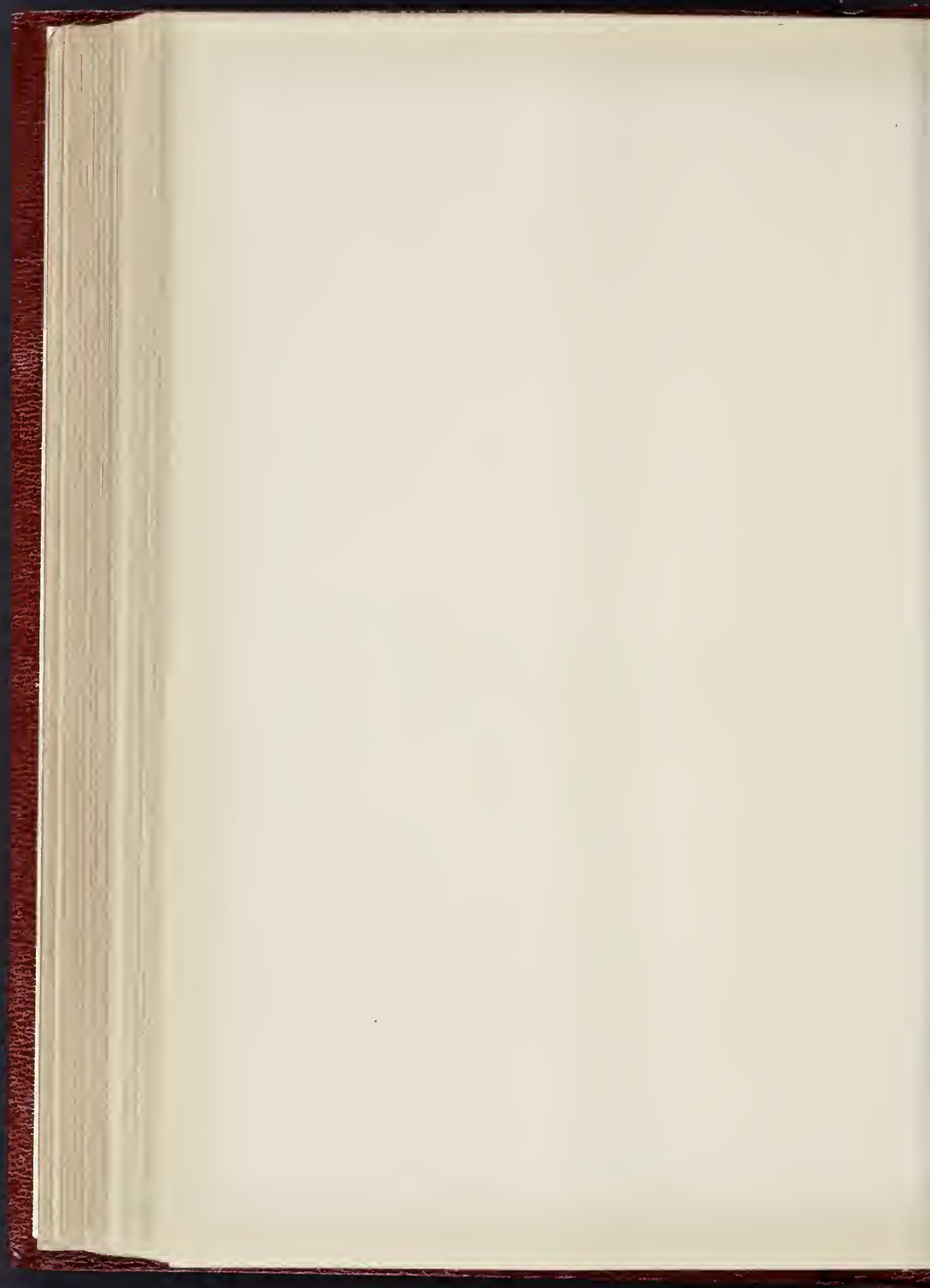
It has been objected by a monthly magazine that the "windows" in this cloister are too large for their purpose. Is such a thing possible in a stone-faced cloister in cloudy England? These traceted openings would not, of course, be glazed.

The usual central shaft was not in this case adopted, as I am assured by a President of an

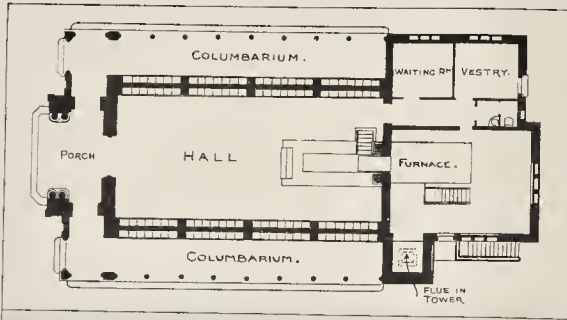


THE BUILDER, OCTOBER 22, 1892.





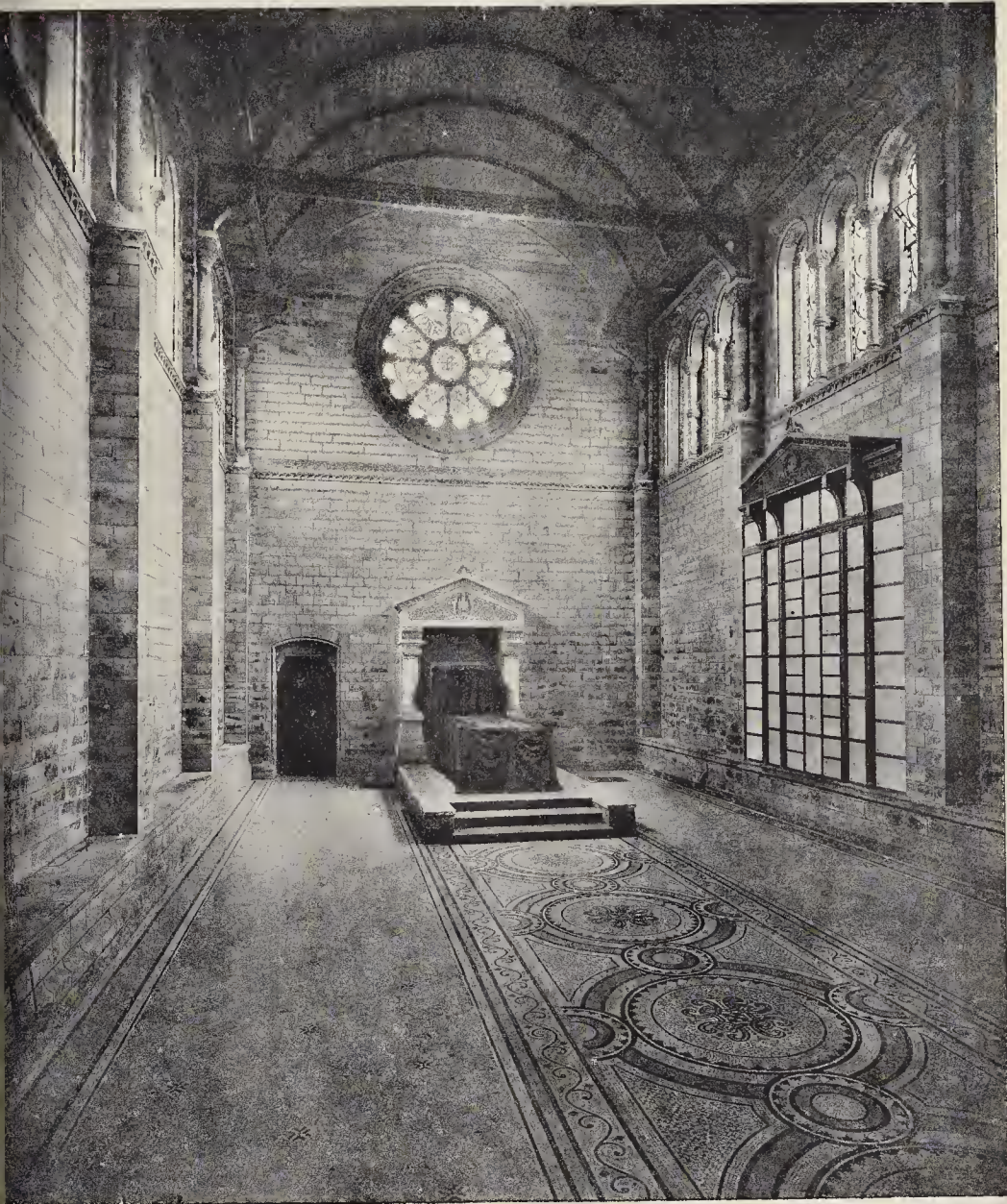




INK-PHOTO SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

NEW CREMATORIUM, MANCHESTER.—MESSRS. SALOMONS & STEINTHAL, ARCHITECTS.

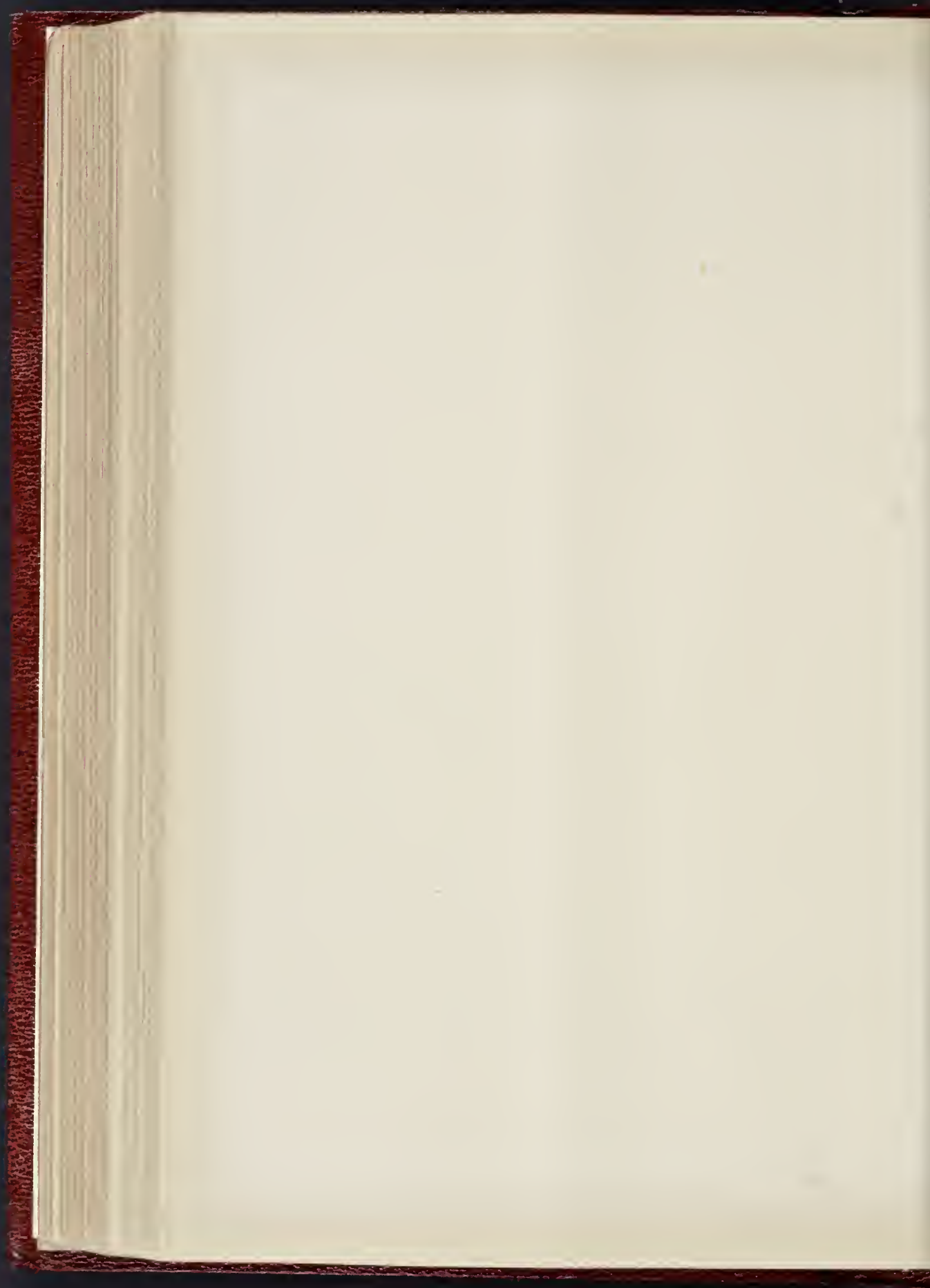
EXTERIOR VIEW AND PLAN.



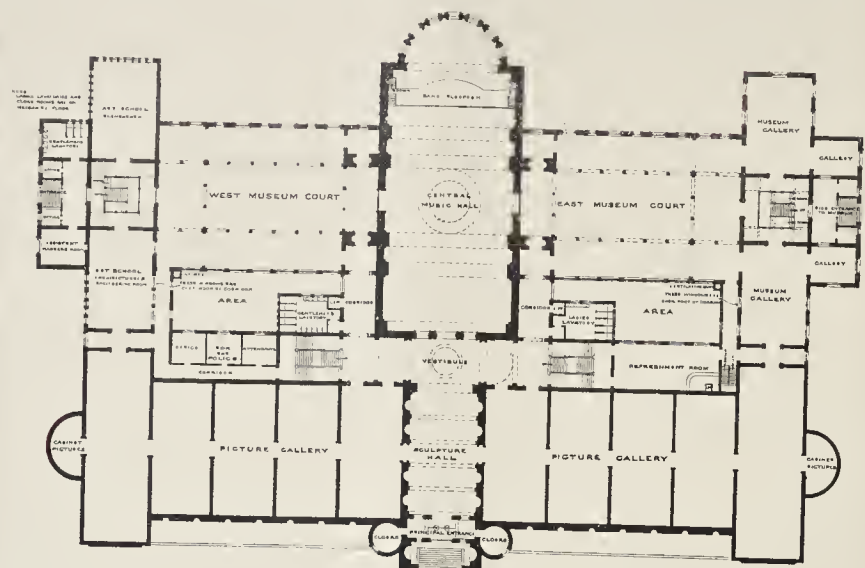
INK PHOTO SPRAGUE & CO. A.S. EAST HARDING STREET FETTER LANE. E.C.

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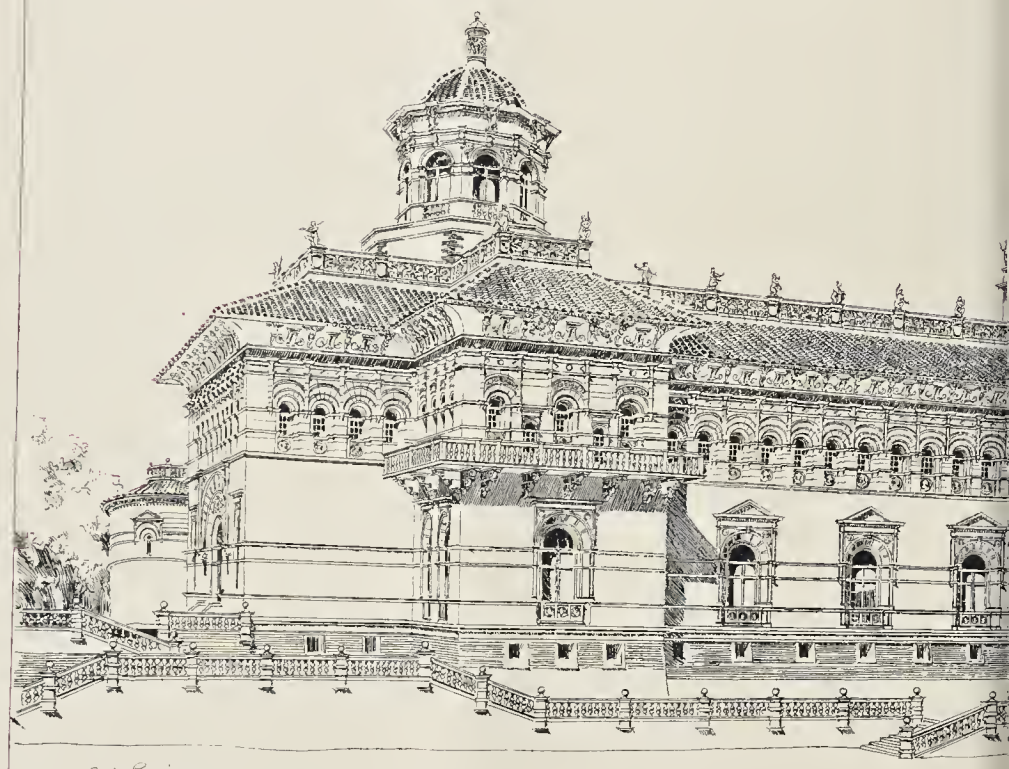
INTERIOR VIEW.







GROUND FLOOR PLAN.



A. W. Francis Del. 92

GLASGOW · MUSEUM · OF · ART · COMPETITION ·
· DESIGN · SUBMITTED · BY · AND · N · PRENTICE · ARCHT ·



PHOTO LITHO SPRADUE & CO 45 EAST HINDING STREET FETTER LANE E.C

RY.—By Mr. A. N. PRENTICE, A.R.I.B.A

English chapter that in a fully-attended meeting it is a great objection, on the same principle, of course, that a similar shaft in any other modern debating-house or court would not be tolerated."

COMPETITION DESIGN FOR GLASGOW ART GALLERIES.

This design was made to suit the requirements of the first set of conditions in the recent competition for the Glasgow Art Galleries. It comprises central hall, museum, and picture gallery, also an art school. The plan is so arranged that the entire building could be thrown *en suite* on any special occasion, with the music hall as the central feature. The picture galleries are on the ground-floor, and the public would have direct access to them from the street,—being one story in height they are entirely top-lighted. The galleries having no exhibition rooms underneath them, are rendered absolutely fire-proof.

The central hall was designed with special regard to acoustics, and to give as imposing and grand an effect as possible. It has a semi-circular vault or ceiling springing from the clearstory windows, and was to be constructed of iron and concrete, faced with plaster decoration and mosaics. The central lantern would be supported on large iron-framed girders, taking the form of the hall ceiling, and resting on massive stone piers, shown on plan. The central portion would be constructed of iron and concrete, faced with terra-cotta, and the floor on top of oak work. The two other cupolas give light to staircases. The museum galleries and top-lighted courts are placed right and left of the central hall, and it was proposed to protect and screen the skylights from external view with ornamental halustrades of terra-cotta work, which would harmonise with the Italian red tiles suggested for the roof. The roof would all be of iron construction, filled in with concrete, and the base of the building up to the level of the ground-floor windows was to be of grey granite. The whole of the external walls above the base would be faced with pink coloured terra-cotta, and the cove under the roof tiles would be constructed of concrete and iron, and entirely faced with coloured mosaics with white as a background. The design, with the omission of the school of art block, was estimated to cost 150,000.

TOWER, ST. MARY'S CHURCH, LYNTON.

The original church, which consists of the south aisle and its west tower, dates from the fourteenth century, but there were very few traces of the old building when the late restoration was put in hand.

The nave and north aisle were of a bastard Egyptian design, and have been entirely rebuilt in the local manner, with wrought-stone arcades and barrel roofs with moulded ribs and carved bosses.

The fine fourteenth-century roof was stripped of the plaster put on about a century ago and opened out and repaired. A portion only of the whole scheme has been at present carried out. The chancel, vestries, morning chapel, and tower now illustrated are yet to be completed. The north porch is elaborately carved and panelled. A figure of the Virgin and Holy Child, now being carved by Mr. F. W. Fomeroy, will occupy the central niche. The builders were Messrs. Bryant & Son, of Barnstaple, and the architects the late Mr. John D. Sedding and Mr. H. Wilson.

The drawing of the tower, by Mr. Wilson, was hung in the Royal Academy Exhibition of this year.

NEW CREMATORIUM, MANCHESTER.

We give an exterior and interior view, and plan, of the new Crematorium for Manchester, built from the designs of Messrs. Salomons & Steinthal of that city, and which was announced to be opened on Friday of this week by the Duke of Westminster, on the occasion of the third annual meeting of the Manchester Crematorium Company, to be held in the hall of the building.

The walls of the building are faced both outside and inside with terra cotta, of a golden-buff tone outside and a creamy-buff inside. The platform on which the bier stands is in Hopton Wood stone, and the canopy is executed in Bath stone.

The arrangement of niches inside the hall in one of the bays is carried out in red sandstone, with white Sicilian marble slabs forming the

front of the niches, and intended to receive the inscription. The remaining bays, both inside and outside, under the arading on either side of the hall, will be filled up as required.

We give also a cut showing the design of the canopy behind the platform for the bier.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of this Council was held on Tuesday afternoon last, at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Tenders.—Tenders were received for the erection of an isolation ward, &c., at the infirmary of Feltham Industrial School. We publish the list in another column.

Blackwall Tunnel Approaches: Working-class Dwellings.—The consideration of the report and recommendations of the Bridges Committee on this question was resumed. Owing to the importance of the subject, and with the view of enabling our readers to clearly appreciate the points of the discussion, we reprint from last week's *Builder* the following four paragraphs of our report of the Council meeting of Tuesday week:—

"The Council has referred to us [the Bridges Committee] several tenders for the erection of the artisans' dwellings on the Yabsley-street site." On further consideration we think that it would be more economical if the Council were to erect the buildings; by so doing it would save the extra cost which would be represented by the contractor's profit, and also the expense of supervising the work. The Council, moreover, could rely upon having the best materials and workmanship, and at the same price that would be charged in the first instance to contractors. We therefore recommend—

"That the Council do erect the artisans' dwellings to be constructed in connection with the Blackwall Tunnel scheme without the intervention of a contractor, and that the Bridges Committee be authorised to take the necessary steps for carrying out this recommendation."

On the presentation of the report Sir Thomas Farrar asked the following among other questions of the Chairman of the Committee, viz.: 1. Whether the amount of the lowest tender for these buildings was 11,356*l.*, and whether the amount of the next lowest tender was 14,163*l.*? 2. What was the amount of the Architect's estimate? 3. Why did not the Committee recommend the acceptance of the lowest tender? 4. Whether the Committee had considered how the work could be superintended if it were undertaken by the Council itself?

To these questions Mr. Grosvenor, the Chairman of the Committee, replied as follows:—1. Yes. 2. 10,800*l.* 3. Because the Committee had reason to apprehend that the tender would be withdrawn, and it had, in fact, since been withdrawn. 4. The Committee had not considered the question of arranging for superintendence; it would be time enough to do that when the Council had decided that it would do the work itself.

Mr. McCall on Tuesday last moved the following amendment:—

"That the matter be referred back to the Committee with instructions to report to the Council which of the tenders referred to the Committee on September 27 is the most advantageous to the Council; or, if they are of opinion that neither of the tenders received should be accepted, it be an instruction to the Committee to advertise for tenders."

He complained of the scanty and meagre information furnished in the Committee's report. He was willing to believe that the Committee had endeavoured to the best of their ability to count the cost before making their recommendation, but the reasons put forward by them were utterly fallacious. If the recommendation of the Committee were adopted it would prove to be a most costly one for the Council and for the ratepayers. It was said that the Council would save the contractor's profit. He denied that that would be the case. Not satisfied with that, the Committee went on to make the further statement that they would save the cost of supervision! Why, if they dispensed with the contractor, with his keen personal interest and his intelligent supervision, they must have some one else in his place possessing a thorough knowledge of the work to be carried out. Men possessing such qualification would want a very high salary for their services. Which of these methods of supervision was likely to prove the most economical and efficient? A contractor had a keen personal interest in the proper performance of the work, and looked well after it, as he was obliged to do to make

it pay in these times when profits were reduced to a minimum. On the other hand, if the Council did its own work, and supervised it by officials to whom it did not matter whether it cost more or less, the expenditure upon it would tend to increase. It was said that the Council would be able to buy its materials as cheaply as contractors could buy them. He entirely demurred to that statement, and said that the large builders, with a thorough knowledge of their business, would be able to buy at least 5 per cent. cheaper than the Council. Then there was the question of plant and machinery. For every building that it undertook the Council must incur a large outlay for plant and machinery, which would have to be sold at less than half-price when the work was finished. That was a matter in which a contractor would have a great advantage over the Council, for he would keep his plant and machinery as part of his stock-in-trade. Another and perhaps still more formidable objection was that if they superseded the contractor and took the work into their own hands they might find themselves in conflict and collision with the working classes on such questions as rates of wages and hours of labour. The Council had very usefully intervened with the view of seeing that men employed by contractors on the work of the Council were fairly remunerated and were not kept at work for too many hours, and the contractors themselves were beginning to recognise the justice of that policy, although for some other reason they seemed to be fighting shy of the Council and its contracts. He thought that the Council could afford to adopt a conciliatory policy towards the contractors; at any rate, it would be useless to attempt to set them at defiance. The contractors were great organisers of labour, and were skilled in the art of building, and the true policy of the Council would be to adopt a conciliatory policy towards them, especially in view of the public buildings and improvements which the Council would have to carry out in the near future, and which he ventured to affirm could not be carried out without the intervention of contractors.

Mr. Holmes seconded the motion, on the ground that the Council was an administrative authority, and not a body which should enter into building speculations. He urged the Council to profit by the fate of its predecessors, the Metropolitan Board of Works, who ventured into land speculations which eventually culminated in acts of jobbery which resulted in the disestablishment of the Board. Surely it was not for the Council to step forward and close the ordinary avenues of trade by competing with builders and becoming building speculators! To do that would, in his judgment, be to take a very false step. By all means let them have their work done well; but that could be achieved by seeing that they had proper conditions in their contracts, and that those conditions were properly carried out. It was not the place of the Council to turn builder and contractor, and it would not succeed if it attempted to do so. The Council had to pay regard to the welfare of the ratepayers as a whole, and not to the wishes of a few. The institution of a Building Committee or Works Department within the Council might place within the hands of the members of the Council some amount of patronage to bestow amongst their friends, but such a thing would not be for the public welfare, and he therefore hoped that the delusive notion of the Committee would be rejected.

Mr. Arthur Arnold said that while he had no objection to the principle that the Council should undertake their own work when they were sure they could do it better than contractors, he was unable to support either the report or the amendment. He thought the report deficient in information, and therefore misleading. They were told that this plan would save the contractor's profit and the cost of supervision, but nothing was said about the important matter of plant. Work of this sort would require costly plant, and he thought the proposal should be further considered in a more practical and businesslike manner.

Mr. Benn, M.P., objected to anything that would shelve the question, and urged that the principle suggested should have a fair trial. They were determined not to be placed at the mercy of contractors, and he contended that they could do the work for themselves as well and as cheaply as it could be done outside. He hoped to see a Works Committee established, and said they should look upon themselves as directors of a large company whose

* For list of these tenders see *Builder*, Oct. 1, p. 271.

duty was to secure large dividends and fair wages. A Works Committee would promote healthy competition.

Mr. John Burns, M.P., said he had consistently advocated the formation of a Building Department or a Committee of Works. He entirely agreed that these operations should be carried out on business lines, but they were all of opinion that it was desirable to eliminate the middleman. It was said that contractors would leave the Council severely alone if they did their own work, but he had letters in his hand in which two large firms offered to tender for their masonry at fixed rates. Not only would they give generous terms, but they would be glad of the work, for they would be sure of being paid. Returns showed that twenty per cent. of the builders of London became bankrupt, to the loss of the merchants and specialists, who, in order to recoup themselves, spread that loss over other work, and made other people, including the Council, pay for it. As to the plant, he contended that they had already a large stock, and more than half enough to build the proposed dwellings at Blackwall. The Committee did not expect to save all the cost of supervision, but they would certainly save the contractor's profit. He reminded the Council that in four important contracts they had paid 8,106l. 6s. 11d. for supervision, and this would have been more than sufficient to pay foremen, managers, and superintendents in their own employ for looking after the work. In another case 498l. had been saved on a job of 1,315l. by the Council carrying out the work themselves. Was that extravagant? At Wandsworth-common the Parks and Open Spaces Committee expended 3,000l. in labour, and he would guarantee that no contractor would have undertaken the work for less than 6,000l. All through, the experience of the committees who did their own work was the same, that a great saving was effected. They got the work better done, and incidentally improved the condition of the workers, besides relieving the rates. Generally speaking, the Council's officers were not in favour of the proposal, being under the impression that it would increase their work and responsibility, but he thought he could assure them that this would not be the case. London would be only following the example of Leeds, Bradford, Manchester, Liverpool, and other places, and even in London the Vestries were beginning to do their own work instead of letting it out to contractors. The large railway companies were adopting the same principle, and in every way the middle-man was being eliminated where possible. They wanted to get rid of sub-contracting and labour disputes, and to place the whole thing upon a fair and satisfactory footing.

Sir J. Lubbock, M.P., said he could not support the proposal of the Committee. If they were to adopt the course proposed they would entirely lose the benefit of healthy and stimulating competition. It was quite a mistake to suppose that they could do away with supervision, even if they did away with the middleman. He maintained that experience had shown that municipalities and governments could not advantageously undertake to do everything, for if they did they were apt to lose the power of control. The Council had quite enough to tax their time, energies, and abilities, without going into building operations; and because the proposal would, in his opinion, tend to increase rates and discourage private enterprise he felt bound to oppose it.

Mr. Henderson said that the opposition to the Committee's report came from the same quarter as the opposition to the trade union and labour policy of the Council. They were told that they must not interfere with private enterprise; but he held that they were there to look after public convenience and interests, and not to safeguard private privileges as in the past. The Council had already undertaken a good deal of their own work, and the result was most satisfactory. The majority of the Council had pledged themselves at the election to eliminate the contractor, and now was the opportunity for carrying out their promises.

Mr. R. Roberts pointed out that the recommendation of the Committee was not a new departure, as they had employed their own labour for a considerable time. Undoubtedly there was great friction between the Council and contractors, whereas if they worked for themselves they would have proper control over the whole thing. Building was an experiment in

direct employment which was not especially difficult, and it was more likely to be a success than a failure. Of course they must have a proper organisation before the Council could do this work, and they must pay properly for skilled supervision. The friction between capital and labour was so intense that they were bound to attempt some solution of the problem, and this would be a beginning. As a builder, he was bound to say that much of the public work done by contract was by no means good.

Colonel Hughes, M.P., supported the adoption of the Committee's recommendation, and said the London School Board had afforded them an object-lesson in the necessity of doing their own work. He did not hesitate to try the experiment, and he had no doubt that they would succeed.

Mr. Sidney Webb said they must not fly in the face of science and economy, both of which pointed in the direction of doing their own work. He considered the Committee amply justified in making the recommendation they did, and he said that no political economist could be found who would now support the doctrine of employing the middleman, and the Council could well do without him. Nearly all colonial railways were now made and maintained by the Government, who saved the exorbitant profit of the contractor by employing their own labour.

After some further discussion, Mr. McCall's amendment was rejected, on a division, by 83 votes to 30.

Mr. Beachcroft moved a further amendment referring it to the General Purposes Committee to consider and report as to the desirability, in the interests of the ratepayers, of the Council undertaking the execution of such works without the intervention of the contractor, and of organising the staff that such a course involved.

Mr. Eneas Smith seconded this amendment, and pleaded that meanwhile work might be given to responsible contractors, so that the many men unemployed in London might have a chance of being engaged.

Ultimately the amendment was withdrawn.

On behalf of the General Purposes Committee, Mr. J. W. Benn, M.P., moved, and Mr. John Burns, M.P., seconded, the following amendment:—

"That all the words after the word 'contractor' be omitted, and that the following be substituted,—" and that the General Purposes Committee be instructed to consider and report on the best manner in which works can in future be carried out, and to make proposals as to the necessary organisation and staff."

This amendment was carried without a division.

Sir John Lubbock, M.P., then moved to amend Mr. Benn's amendment, by leaving out the words after "report on the" in order to insert "whole question, and if they are of opinion that such works can be advantageously carried out by the Council in future, as to the best system under which this can be done."

Mr. Arthur Arnold seconded the amendment. On a division the amendment was lost by 71 to 37, and the recommendation of the Committee, as amended by Mr. Benn's amendment, was then agreed to.

The Proposed Street from Holborn to the Strand.—The Parliamentary Committee presented a long report on this subject, but its consideration was adjourned until next week.

After discussing other matters the Council adjourned at a quarter past seven o'clock.

COMPETITIONS.

INFECTIOUS HOSPITAL, KEIGHLEY.—Thirty sets of drawings were sent in in this competition, and the plans submitted under motto "Isolation" No. 2, by Messrs. Judson & Moore, architects, Keighley, were, as we announced in the *Builder* for October 8 (p. 284), approved and accepted. We now learn that the first premium has been awarded to the plans under motto "Progress," by Messrs. Marshall & Dick, of Newcastle-on-Tyne, and the second premium to the design submitted by Mr. W. de Lacy Aberne, C.E., Birmingham, under motto "Ab Wertha."

MECHANICS' INSTITUTE, RIFON.—The plans of Mr. G. Styan, St. Helen's Chambers, York, have been accepted for a new Mechanics' Institute, Rifon. The plans provide for committee-rooms, reading-room, hilliard-room, library, schoolroom, and lecture-hall, with rooms for the caretaker, and in the yard, rooms for cookery classes, workshop, &c.

THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

The fourteenth Voluntary Pass Examination of candidates for the offices of Municipal Engineer and Local Board Surveyor, carried out by this Association, was held at the Yorkshire College, Leeds, on Friday and Saturday, September 30 and October 1.

The Examiners were:—1. In Engineering as applied to Municipal Work, Mr. E. Pritchard, M.Inst.C.E. (Past President); 2. In Building Construction, Mr. W. Geo. Laws, M.Inst.C.E. (Past President); 3. Sanitary Science, Mr. A. M. Fowler, M.Inst.C.E.; and 4. Public Health Law, Mr. Joseph Lobley, M.Inst.C.E. (Past President).

The following seven gentlemen presented themselves for examination, all of whom satisfied the Examiners, and the Council have granted them the Association's certificate, viz.: Messrs. Gilbert T. Bassett (Birmingham), Joseph P. Greenwood (Bury), Oscar Hellawell (Withington), George W. Lacey (Kettering), Thomas H. N. Farr (Walsall), Thomas L. Perkins (Bristol), and John A. Wright (Bristol).

The next examination will be held in London in April next.

Correspondence.

To the Editor of THE BUILDER.

"ART AND ARCHITECTURE IN TENNYSON'S POETRY."

SIR.—In your last week's leader on the motifs for decorative art to be found in the poems of the late Lord Tennyson you omit,—in an otherwise exhaustive category,—the Idyll of "Gareth and Lynette," which contains much word-painting capable of being transferred to stone or canvas.

The description of "the wondrous gate of misty fairy Camelot" seems especially capable of being thus developed,—indeed, I once attempted such development in my salad days, and no doubt produced a somewhat wild design, with figures probably out of drawing, which has long since past with many another youthful scheme into the *Freight*. But what would Burges not have made of the following!—

"And there was no gate like it under heaven:
For barefoot on the keystone, which was lined
And rippled like an over-fleeting wave,
The Lady of the Lake stood: all her dress
Wept from her sides as water flowing away;
But, like the Cross, her great and poorly arms
Stretch'd under all the cornice and up-bat:
And drops of water fell from either hand;
And down from one a sword was hung, from one
A censer, either worn with wind and storm;
And o'er her breast floated the sacred fish;
And in the space to left of her, and right,
Were Arthur's wars in weird devices done,
New things and old co-twisted, as if Time
Were nothing, so inveterate, that men
Were giddy gazing there; and over all
High on the top were those three Queens, the
friends
Of Arthur, who should help him at his need."

What wonder that to the imagination of Sir Gareth's meander companions it seemed to move in all its twisted phantasy, and that

"they call'd
To Gareth, 'Lord, the gateway is alive!'"

PERCY G. STONE.

** We are obliged to Mr. Stone for calling attention to a fine passage of design which we had overlooked. To say truth, we have never been very fond of the later Idylls, which appear to us very inferior in balance and artistic finish to the first four, and still more to the "Morte d'Arthur," the precursor of them all.—ED.

THE INSTITUTE AND ARCHITECTURE.

SIR,—As the interesting correspondence under the above heading seems to be concluded, may I reply to one or two references to my original letter?

My friend Mr. Blashill has very fairly stated the several points at issue, and which seemed to me opportune to discuss when the Institute has under consideration the qualification of its "Followers." As he rightly points out, the Charter at present stamps the Institute as a professional society willing to admit any one who "has been trained in a satisfactory way for the practice of the profession," and is otherwise "honest" and "decently civil." It was no doubt framed to admit

every class of practitioner in the several departments of professional work. There surely can be no objection to this? Indeed I have personally advocated an extension of its memberships, on the ground that the several crafts in connexion with building should be represented, and that distinguished painters and sculptors should be included amongst its Hon. Fellows, but this was determined to be contrary to the Charter.

It is an anomaly that specialists in any branch should be labelled as Architects and Fellows, and our contention is that in an Institute of Architects, the Fellows, at least, should consist only of those who practise architecture.

This should be no disparagement to the honourable and more remunerative profession of Surveyor.

The formation of any club or group of men inside the borders of the Institute would inevitably degenerate into a clique which in time might prove dangerous to other interests. As the Institute is at present constituted, there is nothing for those who claim for architecture its high prerogative, and who desire to see the Institute advance with the times, but to recognise the fact hinted at by Mr. Blashill that "their sphere of usefulness appears to be outside its walls."

I am not concerned at present to defend the position of those who advocate the recognition of architecture as an "Art."

As you, sir, assert in your admirable article, the scientific element cannot be abrogated without loss to its special claim to respect; and, as you rightly suppose, I in no way intended to omit "Construction," which I suppose to be the science, as you cannot have the art of architecture without the science of construction.

We are awaiting with interest the statement of views held by Mr. Norman Shaw and Mr. T. E. Jackson and of the architects who are not now members of the Institute, which I see advertised in your last issue as about to be published. They will, no doubt, rectify some mistaken notions on the whole subject, and serve to assist the Institute in coming to the conclusion that the charter, if it stops the way of advancement in sympathy with artistic progress, must be revised.

JOHN BELCHER.

Sir,—I have just read Mr. John Belcher's wise and conciliatory letter in the *Builder* of September 3. Being now far removed from the controversial civil war that was raging between architect when I left England, I have had the opportunity of unbiased reflection on the subject, and I think that Mr. Belcher goes to the root of the matter, and proposes a compromise which offers the best solution of the difficulty. Let the Institute alter the name of the examination for membership; if too much is not claimed for it, opposition will disappear, and it will gain the importance and popularity which it well deserves. And let them pursue the same policy with regard to the fellowship, and make the title a distinction awarded to a few. No one, then, as seems often the case now, will be ashamed to add the letters to their names, and the title will be honoured over the whole world.

It is not of the nature of the Institute, before the days of the examination and the necessity for an immediate and wise reform, are conspicuously seen in this colony. The architecture of the Dutch, as seen in what little remains of old Cape Town and in the farmhouses of Constantia and the wide-growing districts of the neighbouring mountain valleys, is extremely picturesque and well-suited to the climate and materials of the country. Ruthless destruction, however, is now going on, and cement and iron erections, covered with the most ignorant efforts at "ornament," are converting Cape Town, built on a site which has been compared to that of Naples, into one of the most dismal cities of the world. Yet it is possible for these destroyers of the fair face of nature, if they have done it on a large scale, to add the magic letters of the Institute to their names, and an F.R.I.B.A. may boast of the demolition of old houses entrusted to his care. Bad architecture is, perhaps, inevitable in a new colony, but it is for the Institute to consider how far it is wise for them to lend, as it were, a sanction to it. HERBERT BAKER.

Cape Town.

VESTRIES AND HOUSE DRAINAGE AND DISTRICT SURVEYORS' DRAINAGE.

Sir,—I was very disappointed on reading your last two issues, and the correspondence on these subjects. A few more letters like Mr. Bernard Dicksee's should be of the greatest interest and value to your readers. With respect to the Camberwell regulations, their prohibition of the use of iron pipe is only on a par with their specifying (1) breeze concrete for the bedding of stoneware pipes, 9 in. by 6 in. pipe where 4 in. should be,

terminal ends of ventilating pipes discharging close to windows, fresh-air inlets at least 75 per cent. too small, &c.

If a District Surveyor's drainage is truly represented by "Notanda's" sketch, I should say that a worse planned job could scarcely be possible; it can only be described as an unventilated, inaccessible, horizontal cesspool. The "trap" is one of the most obsolete, and certainly, as constructed, in a dangerous position, and big enough for a town, and the water-bush from the w.c. would have absolutely no scouring effect, it would simply dribble through a channel which it would wear away for itself in the gradually accumulating soil, &c.

As Mr. Dicksee says, the County Council should take the matter in hand, and, after their regulations have been framed, properly-qualified inspectors should be appointed to carry out and maintain them. It seems to me also that our present day Sanitary Inspectors' work should be modified, the inspection of food, &c., should be apart from the sanitary inspection of houses.

J. KEMSLEY, R.P.C., &c.

The Engineering Exchange, E.C.

"IS THE PROFESSIONAL ASSESSOR A FAILURE?"

Sir,—In reference to the Accrington Technical School Competition, the question might be asked, Who drew up the instructions concerning it?

That, they should be prepared by one who has some knowledge of the cost of work is, I think, indispensably essential, but if you would be so good as to look at the enclosed instructions issued in this instance, you will at once see that either this could not have been the case, or else the Accrington Technical Instruction Committee wanted an exceedingly good money's worth.

I also beg to enclose a copy of the type-written sheet that accompanied my drawings.

A COMPETITOR.

** The accommodation demanded for 6,000. (including supply of gas and water pipes, and heating apparatus) is simply absurd, and so our correspondent appears to have plainly intimated in sending in his design.—ED.

The Student's Column.

CONCRETE.—XVII.

PROPORTIONS OF INGREDIENTS, &c.

THE specification of the proportion of the various ingredients in concrete is frequently ill-considered and indefinite.

We often see specifications in which concrete is required to be composed of Portland cement, sand, and broken stone in the proportion of 1 of cement to 8 of the other materials, but nothing whatever is said as to whether the sand and broken stone are to be measured separately or not; or, the ingredients, perhaps, must be Portland cement, sand, and gravel, proportioned as before, and nothing is said as to whether the sand forming part of the gravel has to be screened from it so that the sand and gravel can be accurately measured. It may be thought that this is a detail of little importance; it is, let us say, of great importance. In the mixture of Portland cement, sand, and broken stone mentioned above, it would be to the contractor's interest to measure the sand and broken stone together in a box having eight times the capacity of the box in which the cement was measured. He would find that the large box, when filled to the top with broken stone, would contain 30 or 40 per cent. of voids between the stones, and it would be a great saving to him to fill these voids with sand, so that the concrete would really consist of 1 part of cement, and (say) 3 parts of sand, and 8 parts of broken stone, or a proportion of 1 to 11 if the ingredients are taken separately. It needs no great insight to see that a 1 to 8 mixture, in which the proportions are 1 cement, 1 1/2 (or 2) sand, and 6 1/2 (or 6) broken stone, will be stronger than the 1 to 8 mixture described above. But when gravel is used, there is an added uncertainty; for gravels contain variable quantities of sand, and unless the quantity in the particular gravel specified be ascertained, or, better still, be entirely eliminated, the strength of the resultant concrete cannot be foretold with any approximation to accuracy. Ordinary gravel may contain from 30 per cent. to 50 per cent. of its volume of sand. Two concretes specified to be of 1 part Portland cement and 8 parts gravel, may prove considerably different in strength. If the gravel contain only 30 per cent. of sand, the mortar in the concrete consists of 1 part of cement to 2 1/2 parts of sand; if the gravel contain 50 per cent. of sand, the mortar consists of 1 cement to 4 sand.

The former mortar will be 50 per cent. stronger than the latter, and experiments have shown that the transverse strength of concrete varies very nearly, other things being equal, as the strength of the mortar in which the coarse ingredients are embedded.

Two series of most interesting experiments, demonstrating the truth of this statement, were carried out by Mr. Darrton Hutton, at the Amsterdam Canal Harbour Works in 1872 and 1878.* The tests were made because the concrete blocks were not as hard and strong as they ought to have been, and Mr. Hutton came to the conclusion that "where the sand was very fine, the less sand that was used the better."

The first series of tests was made with 1 to 9 concretes containing various proportions of Portland cement, shingle, and sand. Taking the transverse strength (at three months) of a mixture of 1 Portland cement + 4 sand + 5 shingle to be 100, we find the strength of a mixture of 1 + 3 + 6 to be 121, of 1 + 2 + 7 to be 225, of 1 + 1 + 8 to be 285, and of 1 + 0 + 9 to be no less than 334.

The second series of tests was made with concretes containing uniformly 1 part of cement and 5 parts of shingle, but various quantities of sand. Taking the transverse strength (at four and a-half months) of a mixture of 1 Portland cement + 4 sand + 5 shingle to be 100 as before, we find the strength of a mixture of 1 + 3 + 5 to be 113, of 1 + 2 + 5 to be 134, of 1 + 1 + 5 to be 289, and of 1 + 0 + 5 to be no less than 361.

A comparison of the ratios existing between the various concretes in the two series reveals the fact that the strength depends almost wholly on the quantity of sand mixed with the cement, and not on the amount of coarse material. In other words, the strength of concrete varies, within certain limits, according to the strength of the mortar, in which the aggregate is imbedded. It must be noticed that this is true within certain limits only, for, although little difference is noticeable in the strength of sandless concrete, whether it contains 9 parts of shingle or only 5, yet, if the proportion of shingle be increased beyond 9 parts, the limit will soon be reached at which the next cement becomes too small in bulk to form a film between all contiguous surfaces of the shingle, and these dry joints are, of course, a source of weakness.

Concrete, however, is seldom used in large masses, with a matrix of neat cement, partly because of the cost of such concrete, but also because of its porosity and the greater care required in its manipulation. In Mr. Hutton's experiments, the blocks without sand were full of holes outside, and not by any means homogeneous inside; those containing only one part of sand were also honeycombed, although not to so great an extent as the foregoing. The "shingle," it must be said, was not "absolutely free from sand."

Fig. 2 (Chapter XL) shows graphically the strength of different mortars at different ages. Roughly speaking, it may be said that the strength of Portland cement mortar 1 to 1 is 3/4 that of the neat cement, 1 to 2 is 1/2, 1 to 3 is 1/3, and 1 to 4 rather over 1/4. Beyond this, the ratio gives results much too low, but the rule is correct enough within the limits named, and no one would think of using concrete with any greater proportion of sand to cement than 4 to 1. Indeed, a much smaller proportion of sand is invariably used nowadays. It is false economy to use too much sand.

The importance of this point is now so well-known that many engineers consider that Portland cement concrete should never have a weaker mortar than 1 to 2, and some even object to use a mortar weaker than 1 to 1 1/2. But different proportions of sand are required for different purposes; where strength is required the least possible quantity of sand should be used; when imperviousness to water is required, a greater quantity of sand is necessary.

Voids in Aggregate.—The object usually aimed at in proportioning the ingredients of concrete is to obtain an aggregate containing the least possible quantity of voids or interstices, and to add to this sufficient mortar to fill these voids with about 10 per cent. in addition, to allow for the mortar joints and for imperfect mixing. The method of ascertaining the voids in any aggregate is simple.—Fill a watertight box of known capacity with damp

* See "The Proceedings of the Institution of Civil Engineers," vol. lxxi, 1878-80, part iv.

aggregate, shaking it well during the operation; then pour into the box sufficient water to fill it to the brim; the quantity of water is the measure of the voids in the aggregate. The voids in the sand can be ascertained in a similar way. Another method is to weigh a certain quantity (say, 1 cubic foot) of the broken material and compare it with the weight of a similar quantity of the same material unbroken. The difference in weight gives the amount of voids in the broken material.

It will sometimes happen that the voids in the aggregate are so large that the filling of them entails either a very weak mortar or an extravagant amount of cement. In such cases, the aggregate is at fault, and the fault will as a rule be that the aggregate is of too uniform a size. The least quantity of voids will be found in those aggregates which contain pieces of various sizes, and machine-broken material usually fulfils this condition better than hand-broken.

It is impossible to state definitely what will be the voids in various aggregates. So much depends on the shape and size of the pieces. Good gravel and shingle, screened free from sand, contain about 33 per cent. of voids; broken stone of uniform size may contain 50 per cent. If the gravel consist of small pieces it may be mixed with broken stone of larger dimensions, and the voids in the mixture need not exceed those in the gravel, although the voids in the broken stone alone might do so to a considerable extent. In this way Lieut.-Col. Gillmore obtained an aggregate (free from sand) containing only 23 per cent. of voids. Ordinary limestone was crushed by a Blake's stone-breaker into pieces of all sizes below 2-in. ones and of various shapes; and gravel was obtained from the sea-shore, consisting, after the sand had been screened out, of pieces varying from the size of a pea to that of a hen's egg. He found that the least amount of voids occurred in those mixtures which contained 15 measures of gravel and from 11 to 15 measures of broken stone. The worst mixture (15 to 27) contained only 30 per cent. of voids.

This is a vast improvement on the voids mentioned above for broken stone of uniform size. Solid concrete made from the latter would be 20 to 30 per cent. weaker than that made from the former, while the cost of the two would be practically the same.

Mortar.—In calculating the amount of mortar required to fill the interstices in any aggregate, due allowance must be made for the voids in the sand itself, and for the shrinkage in both the sand and the cement when these are mixed with water. Roughly speaking, the bulk of cement is, according to Mr. Sandemso, reduced 10 per cent., and of sand 20 per cent., by mixing with water.

Gillmore found that neat Portland cement shrank about 16 per cent. on being mixed with water, and that cement and sand (1 to 1) produced a quantity of mortar about 30 per cent. less in bulk than the two ingredients measured separately; other mixtures (1 to 2, 1 to 3, and 1 to 4) shrank about 23 per cent. in mixing and making into mortar.

With ordinary aggregate consisting of fragments of various shapes and sizes, and containing about 33 per cent. of voids, the following mixtures would produce solid concrete:—

Proportion of dry ingredients (in volumes) to produce solid concrete.	1	1	1	1	1
Portland cement.....	1	1	1	1	1
Sand.....	1	1½	2	2½	3
Broken material.....	3	4	5	6	7

But as we have already shown, solid concrete does not necessarily offer a greater resistance to tensile or transverse stress than does porous concrete; resistance to these stresses depends rather on the strength of the mortar, provided always that there is enough mortar to coat the whole surface of every fragment of aggregate, so that the pieces shall always have a film of mortar between them.

Where impervious concrete is required, it is necessary not only that the voids in the aggregate be completely filled by the mortar, but also that the voids in the sand be completely filled by the cement. To allow for imperfect mixing and for the coat of mortar between the fragments of the aggregate, an excess of mortar should be used to at least 10 per cent. of the voids in the aggregate must be used, and to allow for the film of cement coating each grain of sand, an excess of cement equal to 10 per cent. of the voids of the sand must be used.

The sand also may contain finer grains than would be the case if strength and not imperviousness were aimed at.

Quantity of Concrete Produced.—We have seen that sand and cement shrink in bulk on being made into mortar. In the same way, when cement, sand, and aggregate are mixed together, the bulk of concrete produced is less than the bulk of the several ingredients. The amount of shrinkage varies according to the voids in the materials, according to their wetness when measured, according to the proportion in which the materials are mixed, and according to the amount of ramming to which they are subjected. If the aggregate contain little voids, and the sand and cement be about 10 per cent. in excess of these voids, the measure of the aggregate may be taken as the measure of the finished concrete. Frequently, however, the finished concrete measures even less than the aggregate, because the latter contains an amount of voids in excess of the mortar, and these voids are to a great extent eliminated by ramming. Where an excess of sand is used, the finished concrete will measure more than the aggregate. No hard-and-fast rule can be laid down as to the amount of concrete which will be produced by different materials. Moist Thames ballast, when made into concrete with lime or cement, but without further admixture of sand, appears to shrink from 0 to 10 per cent. If the materials are dry when measured, the shrinkage may reach 15 or more per cent.

OBITUARY.

THE LATE MR. JAMES FOWLER, F.R.I.B.A., OF LOUTH.—To the brief mention made by us last week (p. 306) of the death of this well-known and able architect, we now add the following particulars, which we glean from a long notice which appeared in the *Louth and North Lincolnshire Advertiser* for the 15th inst. —Mr. James Fowler was born in the year 1828, and was educated at the Diocesan School, Lichfield. He was articled to the late Mr. Joseph Potter of that city, architect, and while with him he executed some of the lithographic plates for his work on "Buildings and Tintern Abbeys." Afterwards he assisted Messrs. Bowman & Crowther, of Manchester, with their large and important work on the "Churches of the Middle Ages," and Mr. J. S. Padley, of Lincoln, with his book on "The Ancient Monastic, Ecclesiastical, and Domestic Edifices of Lincolnshire." In 1849 he came to Louth, and was engaged on some work for the county justices in the prison, which was situate in Eastgate, at the corner of Stamsgate, and during this time he measured up the tower and spire of the parish church, a work of some magnitude, the spire being nearly 300 ft. high, and considered one of the finest church spires in the kingdom. In 1851 Mr. Fowler commenced practice in Louth in conjunction with Mr. Joseph Maughan (recently deceased), and during this partnership carried out some engineering works in Northcoates, and the building of the sea sluice at Saltfleet Haven, &c., with other works. This partnership was terminated in 1859, since which time Mr. Fowler has carried on the profession of an architect only. He was elected a Fellow of the Institute in 1855, and for four years sat on the Council, three in succession, during the presidency of Mr. T. H. Wyatt. Many important churches have been designed by him. Amongst them may be mentioned St. Mary's, Lichfield (the Bishop Lonsdale Memorial); St. Swithin's and St. Andrew's in Lincoln, the former with a fine tower and spire, 200 ft. high; the parish church of St. Mary, Newington, London, which was described by the late Sir Gilbert Scott as "one of the finest modern churches in London"; Holy Trinity, Wanstead, Essex; St. Matthew's, Skegness, SS. Mary and Gabriel, Birbrook. St. Michael's Church, Louth, was built by Mr. Fowler in 1863 at a cost of about 3,000. Also restoration of the interesting and important formerly the chapel of the Castle, while to this Church; the restoration of; Tathwell Church; Leverton, Freston Priory, Bennington, and many others in Lincolnshire; Balderton, Hawton, West Retford, Nuttall, and others in Nottinghamshire; and his work extended further, and may be seen in Yorkshire, Hampshire, Suffolk, Surrey, and other counties. Among Alderman Fowler's works near at home may be named the rebuilding of Domus Dei, or Brown's Hospital, Stamford. Mr. Fowler also built Langton Hall, Dingley Hall, Cadwell Hall, Morton Hall, Notts, Dabby Hall, Walsby House, and many parsonage houses in Lincolnshire and adjoining counties. He also erected a large number of business premises, &c., including several banking establishments for Messrs. Garitt & Co., and Messrs. Lindsey Banking Company, &c.—The following is a list

of Mr. Fowler's works which have been illustrated in the *Builder*, viz., King Edward VI. Grammar School and Bede Houses, Louth (Jan. 30, 1859); Church of St. Mary, Newington (April 10, 1859); interior, Church of St. Guthlac, Market Deeping, Dec. 1, 1873; exterior and interior views of St. Clement's Church, Skegness, April 2, 1880; Chancel of St. Swithin's Church, Louth, Nov. 27, 1880; interior of Holy Trinity Church, Gedney Hill, Lincolnshire, July 22, 1882; reredos, St. Mary's, Newington, April 14, 1883; The interior, Bede Houses, Louth, March 5, 1883; interior, SS. Peter and Paul, Bolingbroke, Lincolnshire, July 13, 1889; and changes of Church of St. Andrew, Heckington, Aug. 17, 1889. We understand that Mr. Fowler's practice will be carried on by his son, Mr. Reginald H. Fowler.

GENERAL BUILDING NEWS.

NEW CHURCH, JERSEY.—The new Church of St. Aubin's, Jersey, built on a plot of ground adjoining the site of the edifice which it replaces, is fast approaching completion. The church is built entirely of granite, the exterior walling being of pink Mont Mado granite with dressings of grey Perruque granite; the quoins from the old church were here used when found suitable. The interior is plastered, with pink Mont Mado columns, arches, and general dressings. Its external length is about 100 ft., and the width 70 ft.; the internal length is 94 ft., and the width 61 ft. The roofs are trussed open timber, of fir, bow-tied, and covered over the outside with Broseley tiles. The portion of the flooring under the seats is composed of wooden blocks on concrete, while the passages and chancel are of coloured tiles in patterns. The building consists of nave, aisles, chancel, chancel aisle, organ-chamber, and vestry. A tower and spire will ultimately be built at the southern corner. The nave consists of five bays, moulded with clerestory windows overhead. The chancel-aisles are lofty and richly moulded, as also are the side chancel-arches. The windows throughout are of granite tracery. The church is lit by gas pendants. There are five arches with four pillars on either side of the body of the church, with four large windows and ten smaller ones in the north and south. These do not include the large windows at the eastern and western ends of the church, nor those near the altar. The church will seat 340 people, the seats throughout being of oak. There are reredos of alabaster with bronze shield bearing emblems of the Evangelists and the sacred monograms, which has been executed by Mr. H. T. Margetson, of Chelsea. A brass cross, with five agates, is placed on the shelf of the reredos. Carved oak altar-rails, with figures of the Twelve Apostles in canopies, are being made, but will not be in position for one or two months. A carved oak eagle lectern has been presented by Mrs. Broithwaite. The two west windows of the aisles contain painted glass in memory of Mr. Philip Marrett, the chosen subject being the parable of the Good Samaritan. Another painted window is in memory of the Rev. W. Power Cobbe. These windows are the work of Messrs. Heston, Butler, & Bayne, of London. The remainder of the glazing is of tinted rolled cathedral glass leaded in patterns. The style of architecture is Early English. The church and all the fittings were designed by, and carried out under, the superintendence of the architect, Messrs. J. E. K. & J. P. Cuts, of London. The contractors were Messrs. Woodsford & Harris and Mr. T. Blampied, while Mr. J. Laurens acted as clerk of the works.

NEW BUSINESS PREMISES IN HOLLOWAY-ROAD.

An extensive block of new buildings in Holloway-road, erected for Messrs. Jones Bros., and constituting, with the older premises of the same firm, a kind of North London "Whiteley's," was opened for business on Thursday last, the 20th inst. The new buildings occupy a frontage of about 112 ft., and run back for a depth of about 80 ft. They are six stories in height, the three lower stories being devoted to business purposes, while the three upper stories (which are separated from the business premises by a floor of fireproof construction) are fitted up for the accommodation of the employees of the firm. The superficial area of the basement is about 9,000 ft.; the ground floor has the same area, and the first floor an area of 8,000 ft., making a total of about 26,000 superficial feet devoted to purposes of sale and show rooms. Between the new premises and the old ones runs a narrow turning leading to the stables and electric light works of the establishment, but the new and old premises are connected by means of a subway on the basement level and by a bridge at the level of the first floor. The facade is a free treatment of Renaissance work. The general mass of the building rises to the height of 60 ft. above the pavement, the tower rising to a height of 100 ft. This tower, which at the present time forms the south end of the new block, will become the central feature of the building when the premises are extended to the corner of Lorraine-road. Some play of light and shade is obtained by the introduction of large bay and oriel windows, and the skyline is broken by dormers. The materials used in the facade are buff-coloured malm bricks, with white stone dressings. Under the tower is the principal

entrance, 16 ft. wide and 26 ft. high. The architects of the new building are Messrs. Davis & Emanuel, the surveyors being Messrs. Young & Brown; and the building work has been carried out by Messrs. Colls & Sons, of Camberwell, under the general supervision of Mr. Elliott. Messrs. Dennett & Messrs. Oxenford, the constructional ironwork, Messrs. F. Sage & Co. the shop fronts and fittings, and Messrs. Sharp & Kent the electric light wiring and fittings.

PUBLIC LIBRARY, Ayr.—The memorial stone of the Carnegie Public Library, Ayr, was laid on the 15th inst. by Mrs. Carnegie. The library was designed by Mr. Campbell Douglas, of the firm of Messrs. Colquhoun, Douglas & Morrison, Glasgow. Built of Ballochmyle stone, in the Renaissance style, and situated on the north side of the river, nearly opposite the New Bridge, it contains a lending department, a general reading-room, provided with seats for 103 readers, a reference department, a ladies' reading-room, and a museum.

St. Barnabas Church, Liverpool.—The spire of St. Barnabas Church, Parliament-street, Liverpool, being in a dangerous condition, was taken down by Mr. E. Burns, contractor, under the direction of Mr. T. C. Eddy, 30, North John-street, the architect to the trustees. The whole church is shortly to come down, and the stone and materials will be used in building a church in the Anfield District, to accommodate about 700 persons.

New Church, Newport, Monmouthshire.—On the 26th ult. the new Church of St. Matthew, Barnardston, Maidee, Newport, was dedicated. The building has been erected by Mr. Charles Lock, from designs prepared by Messrs. Graham, Sons & Hitchcock, and is in the Gothic style. The roof is of open timber and match board, covered with slates. The building will seat 512 persons. The general walls are stuccoed, and the woodwork is stained and varnished. There is a transept on either side, and a choir vestry and organ-chamber.

Branch Bank, Aston Cross, Birmingham.—On the 27th ult. a new building was opened at Aston Cross by the Birmingham District and Counties Banking Company for the business of their Aston branch. The premises comprise a banking-room, private-room, strong-room, and a residence for the sub-manager. The building has a height of 35 ft., and is three stories in height. The front is of Bath and red bricks, with dressings of the finest Portland stone to the lower story, and of Islington to the upper portion, the latter being of buff and light red tints. The builders are Messrs. James Smith & Sons. New fittings have been made by Mr. David Lloyd, of Aston. The whole has been designed and superintended by the architect, Mr. C. Whitwell.

Restoration of the Memorial-stone Cathedral.—On the 6th inst. the memorial-stone commemorating the restoration of Dunblane Cathedral was laid by the Grand Master Mason of Scotland, the Earl of Addington. The work of restoration has occupied three years. The work has cost 26,000l. The architect is Dr. Rowand Anderson, of Edinburgh.

Wesleyan Chapel, Eiland, Yorkshire.—A Wesleyan chapel was opened at Eiland on the 15th inst. by Dr. Stephenson. The chapel takes the place of the old one in Eastgate, on a larger site, the new church having a frontage to the Hudson-road. It is in the Renaissance style. The estimated cost is between 6,000l. and 7,000l. There is sitting accommodation for 750. Mr. Waddington, of Burnley, was the architect.

Congregational Chapel, Newton Heath.—On the 15th inst. the memorial-stone of a new Congregational chapel in Newton Heath was laid by the Rev. Samuel Lamb. The new building is situated in Thorpe-road, Newton Heath, with a frontage to Jessie-street. It will be mainly a brick structure, unornamented sandstone in conjunction with Acconington bricks being used. Accommodation will be provided for about 830. The architect for the work is Mr. S. Fell, of Manchester, and the builders, Messrs. Moore & Son, Eccles.

New Church, Hamstead, Staffordshire.—The new church of St. Paul, Hamstead, situated at the junction of the new and old roads from Birmingham to Walsall, and erected in the Early decorated style, was consecrated on the 20th ult. by the Bishop of Lichfield. The edifice, which consists of nave, north and south transepts and a chancel, and choir and clergy vestries, is built of red brick, with Bath stone dressing; the roof is constructed of pitch-pine, and covered with slates, and a bell-turret rises at the east end. Inside the church the nave measures 67 ft. 6 in. by 20 ft. 6 in. aisles are 10 ft. wide, while the chancel is 16 ft. 6 in. in length, and has a width of 20 ft. On either side the transepts project 3 ft. to 4 ft. from the nave. The organ-chamber is arranged to the north of the chancel, and the south is the choir and clergy vestry. The entire cost of the building, which has been erected by Mr. J. Harley, of Walsall, is estimated at about 3,400l., and there is chair-seating accommodation for about 450 persons. The church has been erected from the designs of Mr. William Davis, architect, of Birmingham. A gentleman was seized with a serious illness when the building was only partially erected, and the work has been carried on under the direction of Mr. William Hale, architect, of Birmingham.

SANITARY AND ENGINEERING NEWS.

THE REGISTRATION OF PLUMBERS IN SCOTLAND.—The District Council for Perth, Forfar, and Fife met on Saturday, the 15th inst., in the Town-hall, Dundee. Ex-Ballie Ogilvie, Vice-President, occupied the chair. The minutes of the Congress Committee showed that the thanks of the Council had been tendered to the various public authorities of Dundee, Perth, and St. Andrews for their assistance in furtherance of the objects of the late Congress of District Councils of Scotland. On the question of transferring Dunfermline from this District to the Edinburgh District, a feeling was expressed that it was undesirable to alter the existing arrangements until after the passing of the Plumbers' Registration Bill. The Chairman presented to Mr. W. E. Grimwood, of Montrose, a certificate bearing the seal of the Worshipful Company of Plumbers, London, in recognition of his having passed the examination of the preliminary course of the Company's Graded Syllabus of Instruction for Plumbers. It was mentioned that this was the first certificate of the kind granted to a Scottish student. Mr. J. L. Warden agreed to again hold the Plumbing Class at Montrose, for which and for past services he and Mr. J. Wood were accorded a hearty vote of thanks. Applications for registration were read and referred to the Registration Committee.

WIRKSWORTH SEWERAGE SCHEME.—At a special meeting of the Wirksworth Local Board on the 12th inst., one of the two sewerage schemes submitted to the Board in May last was finally adopted. The scheme adopted is that of Mr. T. S. McCallum, of Manchester. Mr. McCallum proposes to adopt the international system of purification by means of ferrous and peroxide.

BURTON-UPON-TRENT SEWERAGE.—The Town Council of Burton-upon-Trent at their last meeting decided to carry out a scheme for the re-sewering of the town area. The sewage question in Burton is, as is well known, one of great difficulty, owing to the peculiarity of the industry of the place, and the fact that the greater portion of the town is extremely flat. The character of the sewage is such as to render it quite unique as to its composition and physical properties. It is often of high temperature, and very offensive, its volume (often 6,000,000 gallons per day for a town having a population of about 50,000), and the large proportion of solids it contains, all tend to render its treatment one of very exceptional difficulty. The scheme now adopted by the Corporation, prepared by Mr. J. E. Swindhurst, C.E., the Borough Engineer, is for the reconstruction of the sewers throughout the greater portion of the Borough. The estimated cost of the scheme is about 40,000l. It is intended to supplement this by the construction of works for the treatment of the sewage and sewage sludge before it is delivered on to the sewage farm.

FOREIGN AND COLONIAL.

FRANCE.—M. Burel, Chief Architect of the Préfecture de Police, who has been commissioned to make a preparatory study of the project for the rebuilding of the Opéra Comique on the old site, has just finished his report, which concludes by approving (with a few modifications in detail) of the plans submitted by the Ministère des Beaux-Arts to the superior Commission on Theatres, which is to meet in a few days.—The Gobelin collection, which already comprises several thousands of reproductions of tapestries, has been still further increased by a new series of portraits of the painters who have worked for the manufactory.

—M. Roger Ballu, Inspector of Fine-Arts, son of the eminent architect of the Hôtel de Ville, has just been chosen principal Commissioner of the Artistic Exhibitions in France and abroad. He has been succeeded in his duties by M. Armand Silvestre, well known for his novels and art criticism.—A rich Greek banker, M. Schilizzi, has commissioned M. Vaudremer to build a Greek church, which is to be situated at the angle of the Rue Bizet and the Rue Pierre Charron. The church will be solemnly inaugurated next June. The total cost, including the price of the ground, is estimated at 1,500,000 f., all contributed by M. Schilizzi.—M. Paul Delaire, Commissioner of Exhibitions, has lately been nominated keeper of the Sculpture Museum of the Trocadéro, in place of M. Geoffroy Dechaume, who has recently died.—There is some talk of erecting a monument to Emil Auger, the celebrated dramatic poet, in the Palais Royal garden. Auger has been dead about three years.—A committee has been formed to erect a monument at Denain in commemoration of the victory gained by the Maréchal de Villars before this town in 1712. The sculptural portion of the monument is to be executed by M. Henri Gaudé, the pedestal by M. Dittouquet, architect.—The Minister of Public Works has conferred on one of the chief engineers of Ponts et Chaussées the mission of studying both in France and abroad the advantages, from an industrial and technical point of view, of the rack-wheel railway, over the ordinary railway which is now in operation in mountainous regions.—The Delphic excavations were inaugurated on October 7, in presence of M. Honolle, Director of the French School of

Archæology at Athens.—The Minister of Public Instruction and Fine Arts has lately been to Tours and Nantes for the purpose of inaugurating in the former place the statues of Mirabeau and Rabelais, and in the latter, the new Lycée, which is an important building.—The jury on the open competition for a Museum of Painting and Sculpture at Nantes has just given its judgment. The first prize has been awarded to M. Jossé (Clement Marie), architect at Paris, who will execute the work; the other prizes have been given as follows:—2. MM. Artvidson (André), and Antoine (Joseph), architects at Paris. 3. M. Huguet (Eugène), architect at Lyons. 4. M. Blavetto (Victor), architect at Paris; and honorable mention to MM. Louvet, Bréasson, and Conil-Lacoste.—A monument has lately been inaugurated in a village in the Department of Maine-et-Loire to the memory of the Gaul warrior "Dumnaccus," chief of the Andes. The sculptural portion of the monument is by M. L. Bonnemère.—A discovery has lately been made at Toul (Meurthe and Moselle) in the choir of the cathedral, of a tomb hidden in an excavation, and ornamented with an artistic statue of a bishop. It is supposed that this tomb, which is in a rather bad state, was that of Henry De Ville, Bishop of Toul in 1425.—A metal tower, resembling the Eiffel Tower, is to be erected at Lyons on the heights of Gay de Fourvière.—On Thursday last, October 20, a monument was erected in the little town of Morlaix (Basses Pyrénées) to the memory of Doctor Depaul, late President of the Academy of Medicine in Paris. This monument consists of a bronze bust executed by the sculptor, Albert Bartolomé, placed on a pedestal of red sandstone, executed by M. Leidentrost, architect of the Chateau de Pau, from designs by M. Frantz Jourdain, a Paris architect.—The first stone of the "Palais des Consuls" was laid last week at Rouen.—The sculptor, Alfred Boucher, has just finished his model of the statue of Theophraste Renaudot.—The death is announced, at the age of sixty-nine, of M. André Chevrion, honorary trustee of roads in the Ville de Paris.—We have also learnt the death of M. Eugène Rigault, late second Prix de Rome, architect of the Pharmaceutical School, who made under the Minister of Postes and Telegraphs, some remarkable works for the installation of the new telegraph service. M. Rigault was only fifty-one.—M. Pierre Pécaud, architect at St. Nazaire, has just died at the age of fifty-three. He was a pupil of Questel, and built several edifices in Brittany, the depot for the custom-house, the Palais de Justice, several private houses, and the "Grand Hotel" of the town. He was an active member of the Central Society of Architects since 1881.

NORWAY.—A new church has been added to the public buildings of Christiania. It stands on the so-called Jüner Lökke, and has been designed by the city architect, Herr Bull.—Two new churches have been completed on the west coast of Norway, viz., at Kalving and Store Kalås, the architect of both being Herr H. Jeas, of Bergen. The former is Medieval in style, and built of grey granite; the latter, also Medieval, but built of timber.—Several important marble deposits have been discovered near Bodø, on the north-west coast; whilst at Fredrikstad a marble-polishing factory has been established.—An interesting find of Viking urns has been made near Sandefjord, on the Christiania fjord.

MISCELLANEOUS.

THE SURVEYORS' INSTITUTION.—The first ordinary general meeting of this Institution for the session 1892-93 is fixed to be held on Monday, November 14, when the President, Mr. Charles J. Shoppee, will deliver an opening address. The chair will be taken at eight o'clock.

BRADFORD HISTORICAL AND ANTIQUARIAN SOCIETY.—The annual meeting of this society was held on Tuesday evening in the Alexandra Hotel. The chair was taken by Mr. T. T. Eupsall, the President. The annual report was read by Mr. J. A. Clapham, the hon. cor. sec., who congratulated the members upon the flourishing condition of the society, which now numbers 236 members. Papers were to be given during the coming session by Dr. Leadman, F.S.A., Wm. Scruton, C. A. Federer, T. T. Eupsall, John Sowden, and John Lister, M.A., upon a variety of interesting subjects; and during the summer it was proposed to visit Kirkstall, Adel, Otley, Leathley, Grassington, Settle, and Giggleswick, Middleham, Bolton, Wensley, Leyburn, Thornton, Skipton, and Leventhorpe, under able guidance.

RECOGNITION OF A SURVEYOR'S SERVICES.—The Wandsworth Local Committee of the Board of Works for the Wandsworth District have submitted the following resolution to the Board, viz., "That the Committee desire to place upon record their appreciation of the able manner in which Mr. J. C. Bedford, the Surveyor for Putney, has carried out the additional duties of Acting Surveyor for Wandsworth, and recommend that he be paid 300l. therefor (being salary at the rate of 450l. per annum for six months and an additional 75l. as a special recognition of his services)."

REMOVAL.—Messrs. F. Whitfield & Co. announce their removal from 65, Holborn Viaduct to 20, Chapside.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, and Tenders to be delivered.

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Those marked with an Asterisk (*) are advertised in this Number. Contracts, pp. lv., vi., & viii.

LONDON PROPERTIES FOR SALE.—Three notable properties are offered for sale, by private treaty or...

THE INTERNATIONAL EXHIBITION IN ANTWERP, 1894.—The committee of the international exhibition to be held in Antwerp in 1894—to which we recently referred—has now been officially constituted.

FREEDOM BUILDING LAND AT PINNER.—As will be seen by our advertising columns, Messrs. Debenham, Tewson, Farmer, & Bridgewater announce that they will offer for sale, on Monday next, about eight acres of freehold building land at Pinner, forming the first portion of the Royston Park estate, and immediately adjoining Pinner station on the London and North-Western Railway.

THE ENGLISH IRON TRADE.—There is again little alteration to chronicle in the English iron trade. Matters are very quiet, and there are but few fluctuations in prices. Cleveland pig is slightly lower. In manufactured iron and steel only a limited business is being done. Both shipbuilding and engineering are dull. The coal trade, however, is fairly brisk.—Iron.

THE INSTITUTION OF MECHANICAL ENGINEERS.—An ordinary general meeting of this Institution will be held on Wednesday and Thursday next, October 20 and 27, at 25, Great College-street, Westminster, by kind permission of the Council of the Institution of Civil Engineers, when the ballot-lists for the election of new Members, Associates, and Graduates, having been previously opened by the Council, the names of those elected will be announced to the meeting. The nomination of officers for election at the next Annual General Meeting will take place. The reading of papers will follow.

ROAD SURVEYORSHIP, DERBYSHIRE.—The Derbyshire County Council have increased the salary of Mr. R. C. Cordon, their Man-road Surveyor for Mid-Derbyshire, from 130l. to 150l. per annum.

A NEW SANITARY APPLIANCE.—Messrs. Wright Sutcliffe & Son, of Halifax, have sent for our inspection a specimen of their new patent closet-seat, which, they claim, constitutes a new departure in such things in point of comfort, cleanliness, and durability. The invention consists in covering the closet seat (or bath-top, for the invention is applicable to baths) with what they describe as "a tough, waterproof, non-conducting material." We are not told what the said material is, but it has very much the appearance of corticine. Undoubtedly this would usually prevent when dry a warmer surface to the user than a mahogany closet-seat or bath-top, if by the material be non-absorbent (as the term "waterproof" would imply) the new appliance is likely to find favour, especially for use by invalids.

PROPOSED NEW BRIDGE OVER THE MERSEY.—It is proposed to construct a bridge across the Mersey from Widnes, ten miles from Liverpool, to Runcorn, in Cheshire. The bridge will be used for vehicular traffic. The Corporation of Widnes has decided to seek Parliamentary powers to enable them to contribute 30,000l., conditional on the town of Runcorn contributing a similar amount.

MEETINGS.

- BRITISH MUSEUM.—Miss Emily Penrose on "Greek Vases of the British Museum: black-figured vases." 11.245 p.m.
Sanitary Institute (Lectures for Sanitary Officers).—Professor W. H. Corfield, M.A., on "Sanitary Appliances." 8 p.m.

WEDNESDAY, OCTOBER 26.

Institution of Mechanical Engineers.—Ordinary General Meeting. Two papers to be read. 7.30 p.m.

THURSDAY, OCTOBER 27.

Borough Road Polytechnic Institute.—Mr. Lewis Day on "Workaday Art." 8 p.m.

Institution of Mechanical Engineers.—Ordinary General Meeting (Continued). 7.30 p.m.

FRIDAY, OCTOBER 28.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. Wright Clarke on "Details of Plumbers' Work." 8 p.m.

RECENT PATENTS:

15,193.—PAVEMENTS, &c.: F. Haines.—This invention relates to improvements in constructing cement or tile pavements, floors, platforms, walls, &c. The device consists in the construction and application of one or more perforated hinder-bars of iron or other suitable metal, and of straight or other shape, which are set at an angle in the lower or concrete course of the block, and which extend into the top layer, or wearing course, as to units by the setting or solidification of the two courses, the block and hinder bars into a solid mass, and which the hinder bars or concrete part. Another portion of the invention consists in the employment of interlocking metallic hinder-bars or plates.

15,195.—BUILDINGS, FIREPROOF WALLS, &c.: F. Haines.—This invention relates to improvements in buildings, to save space in buildings, to cause more air to circulate in them, and at the same time to make them fireproof as considerably less than the usual cost. It is also claimed that the method of construction which is the subject of the patent is more sound-proof and firmer than wood partitions inside and outside of buildings for houses of every description, churches, chapels, schools, railway premises, and the like. This is effected by means of a mixture of cements and sand applied to one or both sides of a rigid mesh expansion metal supported with bar iron at the distances required, and which the hinder bars or concrete floor to rest with rolled-iron joists and other iron.

15,245.—BRICK-MAKING MACHINERY: L. Seager.—The invention relates to improvements in machines for making or moulding bricks, tiles, &c. The invention consists in the combination with an intermittently-rotated table of a series of mould boxes, in each of which is a sliding frame carrying a hinged or pivoted plate, forming the top of the mould, and adapted to be at certain intervals to be lifted and tilted in order to deliver a moulded brick. In connexion with the driving shaft and rotating table is arranged a plunger, which is adapted to slide thereon, and which is adapted to deliver a moulded brick. In connexion with the sliding in a box with guide, adapted so that as each mould is brought beneath it it descends and compresses the clay. A horizontally sliding knife is also provided for cutting off the clay which remains projecting above the moulds after the compression is completed. Mechanism is also provided for receiving the bricks and conveying them away.

15,311.—WINDING-SASHES: L. Seager.—This invention relates to sliding and easement sashes to doors and the like, and has for its object to prevent rattling, and to render them dust and draught proof. When applied to a sliding-sash, one of the sash stiles is grooved, and the adjacent pulley-groove of the second sash is adapted to receive a piece of wedges, one of which has a sash-rod connected to it, and is connected to the sash in such a manner that it cannot move longitudinally relative thereto, but has a slight lateral movement. The other wedge, which is arranged between the first-mentioned wedge and the window-casing, is capable of a slightly longitudinal movement relative to the latter, and means are provided, acting by a lever, for effecting such longitudinal movement. After the sash has been opened or closed, the movement of the last-mentioned wedge presses the first wedge tightly against the pulley-stile, and prevents the rattling of the sash and forms a tight joint.

10,831.—DOORS: E. R. Baller.—This specification describes an improved method for preventing persons from passing through a door, and means are provided, acting by fingers, clothing, &c., being shut between the hinges on the side of doors and frames. The inventor fixes to and at the edge of the frame near the door a piece or pieces of leather or other ductile material (called the guard), the other portion of the same projecting over and lying against the door. On the door, and covering this guard, is placed a cover.

15,644.—SASHES: H. H. Lake.—This invention relates to metal sashes or frames for holding the glass in other transparent material of a window, door, &c. Glass, especially art glass which is made to embody designs of various kinds, has been hitherto usually set in a lead

DISSOLUTION OF PARTNERSHIP.—We are informed that the partnership between Mr. G. H. Broughan Glasier and Mr. Henry J. Dowden, under the firm of Glasier & Sons, of Spring-gardens, surveyors, land agents, and auctioneers, having ceased by effluxion of time, Mr. Dowden will carry on his practice at No. 314, Regent-street, W.

TYWYFORD'S "DELEGE ADAMANT" WATER CLOSET.—Mr. Twyford sends us particulars and a diagram of this closet basin, the special recommendation of which is extra strength, the thinnest part being more than an inch thick. It is made in extra strong Chiffé Vale fire-clay.

THE SANITARY INSTITUTE.—At a meeting of the Council of this Institute, held on October 12, Professor Anthony Roche, Mr. R. E. Middleton, M. Inst. C.E., and Mr. W. Howard Smith, City Engineer, Carlisle, were elected Fellows. Fifteen members and fifteen Associates were duly elected. Mr. Boehmann, of Paris, was elected Honorary Fellow.

"CATHEDRAL COURT," GLASGOW.—The architects of this building, illustrated in our last, write to say that the roof was laid with Val de Travers asphalt, and not with Limmer's, as before stated. The mistake was not ours.

EXHIBITIONS IN SWEDEN.—A syndicate has been formed for establishing a permanent industrial exhibition in Stockholm, and it is proposed to hold a Scandinavian industrial exhibition in Malmo in 1895.

* See our illustrations of the staircase and dining-room, August 9, 1891.

came or sash, difficult of construction and expensive, besides rendering skilled labour necessary. In addition, various devices are frequently employed to necessitate the use of this invention it is claimed that all these objections are obviated, and that a strong and durable parallel sash can be constructed at a greatly reduced cost. The invention consists in a metallic frame-work or sash of peculiar character and construction, and in the combination therewith of suitable fastening devices for securing the parts of the sash or frame-work together.

NEW APPLICATIONS FOR LETTERS PATENT.

October 3.—17,892, T. Rhys, Appliance for Use with the Sash of Water-closets.—17,888, E. Mackness, Locking Window-sashes.—17,866, J. Hamblet, Freasting Bricks, Blocks, Tiles, &c.

October 4.—17,829, W. Copping, Bolts or Fastenings for Emergency Doors of Public Buildings.—17,838, F. Ovenden and H. Banker, Water-pipes.—17,655, J. Mayne, Ventilator Attachment to Windows.—17,670, J. Pollock, Securing Window-sashes.—17,676, K. Dampier, Window-sash Frames.—17,685, T. Edgeworth, Wood Paving Blocks.

October 5.—17,699, R. Coates, Automatic Gate or Door for Steps where double gates or doors are required.—17,715, T. H. Moorhead, Braces, Grates, Cookery-racks, &c.—17,720, H. Millar and J. Darty, Construction of Window-sashes to facilitate glazing, painting, or cleaning from the inside.—17,754, G. Berend, Filing and Sealing Sashes.

October 6.—17,750, P. Hancock, Tool-holder for use in connection with boring, mortising, or tenoning machines.—17,850, J. Fandler, Stone-planing Machines.—17,810, J. Fandler, Stone-planing Machines, &c.—17,853, S. Jennings and J. Morley, Water-closets.

October 7.—17,876, R. Hildre, Wheelbarrows.

October 8.—17,942, W. Worssam, Band-saw Guide.—17,931, E. Bennett, Mouldings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,067, R. Wilding, Wash-out Water-closets and the flushing of the same.—14,689, B. Cochran, Gun Iron. Pins, Canada rod.—14,698, C. Price, Combination Drain-pipe.—14,831, E. Hoyle, Fastening Saabes.—15,434, H. Lawrence, Simple Window-sash, reversing invention.—15,595, J. C. Runtz, Sewer Vent. Pipe.—15,616, J. Moore, J. Moore, Grates and Stoves.—16,429, J. Metherell, Door knobs and Spindles.—16,445, J. Bartlett, Warming and Ventilating Buildings.—16,528, J. Norton, Door-handles.—16,548, W. H. Jones, Fire-Proof Tops for Chimneys and Ventilating shafts.—16,619, G. Evans, Wood-saws.—16,656, F. Plumstead, Electric-light Fittings.—16,736, A. Crickbank, Chipping tool.—16,815, W. Kitching, Drain, Water, Gas, and Sewer Pipes, &c.—16,853, J. Moore, Grates and Stoves.—16,848, J. Rostron and J. Hilton, Imitation Tiles suitable for Hearths, Grates, Floors, &c.—17,223, H. Smolinski, Mitre Block and Joint Cramp.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Objection for Two Months.)

90,280, Craven, Dunnill, & Co. (Ltd.), and F. Smith, Tiles, &c.—21,004, H. Critch, Preparing, Fitting, and Laying Blocks for Floors, Walls, or Ceilings of Wood or other material.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 10.—By Eastman Bros.: 70 to 76 (even), Danby-st., Peckham, l. r. 1041, 1,270, 160, Malpas-rd., New Cross, ut. 72 yrs, gr. 44, r. 262, 2551.—By E. Jackson, 1, Agnes-st., Mile End, ut. 69 yrs, gr. 52, r. 321, 340.

OCTOBER 11.—By A. & B. Real Co.: l. gr. of 1264, Notting-hill, ut. 71 yrs, gr. 52, r. 1,262, 1, 2 to 18 (even), Carlisle-gate, ut. 71 yrs, gr. 31, 108, r. 1257, 1275, 40 and 44, Walmer-rd., ut. 71 yrs, gr. 161, 210.—By Humbert, Son, & Pkitt: Enclosures of l. land, Wallington, 6th, 2r. 37p, 57,602, 1 plot of l. land, 4302, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 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OCTOBER 11.—By A. & B. Real Co.: l. gr. of 1264, Notting-hill, ut. 71 yrs, gr. 52, r. 1,262, 1, 2 to 18 (even), Carlisle-gate, ut. 71 yrs, gr. 31, 108, r. 1257, 1275, 40 and 44, Walmer-rd., ut. 71 yrs, gr. 161, 210.—By Humbert, Son, & Pkitt: Enclosures of l. land, Wallington, 6th, 2r. 37p, 57,602, 1 plot of l. land, 4302, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 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764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

OCTOBER 12.—By Daniel Smith, Son, & Oakley: "Cage Farm" and 534 acres, Southminster, Essex, l. r. 3002, 3,015.—By Ramsey & Co.: 96, Queens-rd., Peckham, l. r. 601, 8702, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63,

LONDON.—For the erection of stabling, &c., and outbuildings, at Wandstead. Mr. Herbert Riches, architect and surveyor, 3, Crooked-lane, E.C. 4.— F. L. Willmott £750 | North Bros. £890 J. Jelliffe 750 | T. Osborn & Sons (accepted) 683

LONDON.—For erecting sixteen houses, Hart-station, Bethnal-green, for Col. Warde. Messrs. T. & W. Stone, architects, Great Winchester-street, London-wall, E.C. 1.— J. Jarvis & Son £3,150 | Greig & Son £4,387 Wire & Forrest 4,897 | G. Knight & Sons, Can-Thomson & Son 4,682 Robert-street, Bethnal-Higgs 4,969 | Green (accepted) 3,907 Rountree 4,557

LONDON.—For alterations and additions at No. 10, Bentinck-street, Cavendish-square. Mr. Robert Willey, architect and surveyor, 33, New Bridge-street, E.C. 4.— Rows £2,000 0 | Holliday & Greenwood, £1,038 0 Trales & Son 1,131 0 | Carlisle 854 0 Keldray 1,092 17 | Jones 828 0

LONDON.—For converting the private dwellings, No. 21, Northcote-road, Clapham-junction, into a shop. Mr. M. V. Trevelyan, architect and surveyor, Acre-lane, Brixton.— Clarke £253 | Sumner 412 Sumner & Son 571 | Stuart & Son 398 Maxwell (limited) 444 | Rice & Son 375

LONDON.—For alterations and decorations at No. 124, Queen's-gate, S.W. for Mr. N. Norton. Mr. R. A. Briggs, architect, 4, Devon-shire-square, Bishopsgate-street Without. Quantities by Messrs. Fryce Curzon & Leigh, 17, Victoria-street, Westminster, S.W. 1.— Foster & Dickson £8,287 | Holloway Bros. £2,321 Harrison & Spooner 3,670 | Patman & Potheringham, 3, 273 E. E. Nightingale 3,335

LONDON.—For building Ward's Schools, Thames Embankment, for the Corporation of the City of London. Mr. A. Murray, City Surveyor.— A. Kelett £23,855 | Nightingale 47,577 Lawrence 14,759 | Kirk & Randall 17,420 Chessman 16,610 | Kilby & Gayford 17,238 Lawrance & Son 18,260 | Perry & Co. 17,227 Cherriman 18,247 | Mowlem & Co. 16,756 J. T. Chappell 18,517 | Atcheron & Latta 18,512 Brax & Son 17,843

LONDON.—For rebuilding premises, 24, 25, and 26, Long Acre. Mr. C. A. Legg, architect, 13, Grosvenor-street, Aldersgate. Quantities by Mr. W. Hawker.— F. & J. Wood £888 | Howard & Co. £734 Patman & Potheringham 793 | Nightingale 774

LONDON.—For taking down and rebuilding stables and granary at rear of 103, High-street, Deptford, S.E. for Mr. Jas. Murray. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E. 1.— R. Soper £1,580 0 | W. H. Lorde & Son £597 0 A. Wilson 1,510 0 | S. R. Best 954 10 T. D. Long 1,018 0 | Accepted.

LONDON.—For repairs to Norman's Wharf, Ravensbourne-street, Deptford, S.E. for Mr. W. C. Mookford. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E. 1.— A. Wilson £195 15 0

LONDON.—For repairing and painting factory, office, &c., at Nos. 64, 66, 68, and 70, Gray's Inn-road, for Messrs. Francis & Co. Mr. Walter Graves, architect, Winchester House, Old Broad-street, E.C. 4.— K. E. Nightingale £113 0 | Droyler & Co. £195 0 Etman & Son 112 0 | Houghton & Son 83 0 Shaw 112 0 | Segmann 85 10 Maxwell Bros. 111 0

LONDON.—For new front and fittings at the "Plough Tavern," Hornsey-road, for Mr. Fielding. Messrs. Thorpe & Furniss, architects. No quantities supplied.— Anley £1,494 | H. & F. Fernman 1,375 Voller 1,473 | Accepted.

LONDON.—For alterations and new tank front at 189-192, High-road, Kilburn, for Messrs. J. Heworth & Sons, Limited. Mr. H. T. Bonner, architect, King-street, Clerkenwell.— Allen & Sons £568 0 0 | H. Fagg £293 0 0 W. Rosenburg, 64, Westminster Bridge-road, S.E. 1.— J. & W. Taylor £519 9 | F. H. Hopkins £265 0 J. Hooborn 508 0 | W. Rosenberg, 64, Westminster Bridge-road, S.E. £250 0 0

LONDON.—For alterations to the "Mitre Tavern," Fish-street-241, E.C. for Mr. H. A. Baxter. Mr. J. W. Barnes, architect, Fenchurch.— J. & W. Taylor £519 9 | F. H. Hopkins £265 0 J. Hooborn 508 0 | W. Rosenberg, 64, Westminster Bridge-road, S.E. £250 0 0

LONDON.—Accepted for alterations and new tank shop front at 247, Old Kent-road, for Messrs. J. Heworth & Sons, Limited. Mr. H. T. Bonner, architect, King-street, Clerkenwell.— W. Rosenberg, 64, Westminster Bridge-road, S.E. £250 0 0

MANNINGTREE.—For alterations and additions to the Wesleyan School. Mr. J. W. Starr, architect and surveyor, Gipsy-chambers, Colchester.— T. Canham £245 3 0 | F. B. Canham £230 0 0 S. Parsons 249 0 0 | G. R. Hawkins 212 1 6 F. Dupont 236 0 0 | W. Penn 210 7 0 T. Carrington 224 0 0 | J. W. Hamlyn, Clacton. Zapper Bros. 230 0 0 | on-Sea (accepted), 204 9 6

MANSFIELD (Notts).—For the execution of sewerage works, Newark-lane, &c., for the Corporation. Mr. R. Frank Vallance, Borough Surveyor, Mansfield.—

Navvies-lane. Church-lane. J. Tomlinson £258 2 8 229 3 7 Fisher Bros. 250 0 0 203 13 0 Revill 220 0 0 172 13 0 J. Bradley, Lincoln 184 10 0 W. A. Vallance, Mansfield 178 0 08 * Recommended for acceptance.

MANSFIELD (Notts).—For alterations to premises in connexion with the "Blue Boat" Inn, Mansfield, for Mr. T. Taylor, Mr. R. Frank Vallance, architect, Mansfield.— J. Greenwood £300 | G. Bell & Son £162 Fisher Bros 496 | E. Cuddy 440

MANSFIELD (Notts).—Accepted for alterations to premises, warsop, near Mansfield, for Mr. W. White. Mr. R. Frank Vallance, architect, Mansfield.— Adam Eastwood, Warsop £271 0 0

NORTHFLEET.—For alterations and additions to Catholic Church. Mr. J. T. Walford, architect. Quantities supplied.— Martin £838 12 8 | Carter 471 9 1 Daring 618 0 0 | Mallon & Walker 498 20 0 Tuffe 869 0 0 | Gravesend 498 20 0 * Accepted.

WALLASEY (Cheshire).—For erecting a villa residence at Wallasey, for Mr. Wm. Field Cox. Mr. T. C. Eldy, architect, 30, North John-street, Liverpool. Quantities by Mr. R. Kilmoroch.— Tomkinson & Sons £1,187 0 0 £239 0 0 Binkley & Co. 1,190 0 0 239 0 0 John Shaw 1,008 16 6 197 16 6

WALLASEY (Cheshire).—For erecting a bangalow at Wallasey. Mr. T. C. Eldy, architect, Liverpool. Quantities by Mr. R. Kilmoroch.— McFall £1,546 | Crooks £269 Bells 1,236 | Adams 968 Tippine 1,092 | Mosker £271 9 1 Naylor 1,048 | Burns 560 Bleskley 590 | Losdale 568 Burt 671 | Jones & Bennett 593

WALTHAMSTOW.—For the erection and completion of a school for technical instruction, at the rear of the Marsh-street boys school, Walthamstow, for the Walthamstow School Board. Mr. W. A. Longmore, architect, Bridge-chambers, Walthamstow.— Anson £540 9 1 | K. Bland £405 0 Rhedfield 438 0 0 | Evans 349 5 Watling 438 0 0 | Evans 315 0 Hunt 431 0 | Pearce, New Southgate* 372 0 Blead 413 0 | Richardson 344 10 1 * Accepted. (Architect's estimate, £203.)

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The Builder.

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Design for the Birmingham General Hospital: Corner of the Administrative Block.—By Mr. W. H. Bidlake, Architect	Double-Page Ink-Photo.
Hall and Staircase, Buller's Wood, Chislehurst.—Mr. Ernest Newton, Architect	Two Single-Page Photo-Litho's.
Stained Glass Windows for the Imperial Institute.—Designed by Mr. Clement Heaton	Two Single-Page Ink-Photo's.

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Partnership in Art and Architecture.



SOME remarks which we made recently in regard to the prevalent method of the production of stained glass as a form of manufacture by commercial firms drew forth a letter from

an artist in stained glass (p. 304, ante) suggesting that the same objection might be made to the frequent cooperation of architects as joint producers of the buildings, the plan and design of which are conventionally attributed to the "firm" and not to an individual mind. We pointed out, in a note to the letter, some reasons for thinking that the cases are not exactly parallel; but the subject is one which seems to admit of some further consideration.

The system of partnership in the production of works of imagination, both in art and literature, receives a good deal of countenance from the practice of the present day. It might be naturally supposed that only a single mind could well plan and relate an imaginary story or novel. But we have seen a notable exception to this in the case of the military novels of MM. Erckmann and Chatrion, in which the result was certainly successful in itself, and in which there was no perceptible effect of patchwork which could have given, to a reader who was not in the secret, any idea that the books were the product of two minds. The Erckmann-Chatrion novels, however, were a type of literary production of rather a special class, since they were in the first place historical novels in which the main events were taken as they really happened, and even some of the principal characters adopted from historical sources; and they were novels written to serve a moral purpose and not merely for intellectual entertainment; and after all (a consideration which says much for the real genius of the joint authors) the majority of readers were probably far more attracted by the real interest of the stories than by the moral supposed to be conveyed. Quite recently we have seen several examples of novels, written purely as

stories and to no moral end, jointly produced by two authors; but the leading literary critics of the day do not appear to consider the result satisfactory. In each of these cases one of the two authors has been a man of more marked and recognised genius than the other, and it appears to have been felt by many critics and readers that the resulting book was not homogeneous in style and construction, and that the more powerful of the two writers was to some extent hampered by the association with his colleague. And if we turn to the most imaginative department of literature, poetry, we can hardly imagine the possibility of such a partnership being carried out, nor can we recall any poetic work of the slightest importance which has been put forth as the production of two authors.

In the field of art, as in that of literature, it would seem that the more we approach to purely imaginative work the less is the possibility of partnership. We can hardly imagine the case of two minds being concerned in the creation or sketching out of a work of sculpture, or two sets of hands being concerned in the modelling of it. We have had cases, indeed, of sculptor's "ghosts," but in those cases the ghost was the real designer and modeller, and the ostensible sculptor only a fashionable figure-head. In regard to painting we may have brought against this opinion the indubitable fact of the work of pupils on the pictures of some of the masters of the Renaissance. But here the idea and design at least were those of the master, the work of the pupils being confined to painting in subordinate figures and accessories; and even in this case there can be no doubt that the work suffered as a whole, though (or because) it would be produced in a shorter space of time. We can hardly imagine, in looking at a picture which is such a superb whole as the Bacchus and Ariadne of Titian, for instance, that any but the one hand can have touched it. There have been a good many instances of painters who had differing gifts assisting each other in joint productions; one painting a landscape, for instance, and the other painting in the figures in it, but such pictures have generally been mainly realistic in their aims, and do not belong to the biggest class of productions of the art. In the present day the conviction of the importance of unity of

sentiment and handling in a picture is much stronger than perhaps in any former period, and no one would expect to get what can in the highest sense be termed a "picture" by the union of two painters. No one could ever imagine for instance, in looking at the paintings of Mr. Davis, in which cattle and landscape form equally important elements, that the cattle were put in by another hand; the unity of colour and sentiment in the whole is too obvious to admit of such an idea. Still less could we imagine it in the case of such yet more ideal pictures as Frederick Walker's, in which the figure and the landscape are not merely in harmony with each other in sentiment and colour, but appear as one conception, an idyllic poem in painting, in which the feeling of figures and landscape is inextricably blended, and the one element of the picture can hardly be thought of as separate from the other.

When we come to such an art as stained glass, there is no doubt one important difference in the position. The painter paints his picture with his own hands, by a process which is not mechanical, but is the exercise of his own individual movement of hand and sense of touch. There is no mechanical work to be done after he has finished. The glass painter may work a good deal with his own hand on the glass itself (with a much less tractable method and medium than the oil painter), but for a good deal of his effect he is dependent on the chemical or culinary process of incorporating the colour with the glass, and for the final result he is dependent also on the mechanical process of leading-up the glass. Thus in the final production of a glass window a good deal of work comes in which may be defined as "manufacture," and as this manufacture can be done more cheaply and expeditiously by concentration of capital and plant and division of labour than by single effort, it is thus that we come to have firms who make it their business to turn out stained glass as a commodity, just as other firms turn out (let us say) carriages. If this business were confined to manufacturing windows from the designs of known artists, it would be a perfectly logical position, though even in that case it may be doubted whether the original design would not suffer from the influence of wholesale manufacture, in the weaken-

ing of the individual character of the design, and in the introduction of too mechanical a level of workmanship; and one eminent designer of stained windows has felt this so strongly that he has practically turned manufacturer himself, in order to have his glass manufactured and set up under his own eye and in accordance with his own perceptions. But of course we know that as a matter of fact the manufacturing glass firms nominally undertake to furnish design also; the window is ordered from the firm just as a carriage is ordered in Long-acre, and though we know that some one man must make the design for the window, we never hear who it is: the individual element in the art is kept in the background. In the case of the best class of glass firms one of the partners is probably an artist and actually designs the windows, though the information that this is so is seldom volunteered: it may be got at by "curious" persons who like to ask questions. In other cases the real designer is a craftsman in the employ of the firm, whose name never appears; or (as described in a letter which we print on another page) a number of "artists" are kept to turn out whatever drawings are necessary to the production of windows. We take the letter of "An Art Workman" to be a description of what may be called the lowest deep to which this kind of traffic in stained glass descends, not as a typical instance, though we have no doubt that the state of things he describes does exist.* But even in the better firms, where there are men employed who may be called artists, this system is certain to lead to the adoption of a mere dead-level of semi-mechanical design, stock subjects treated in a stock manner, which may, when fixed in their place, have a certain value as decorative effect, but which never can have any intellectual interest as design or thought, because they are not produced with that end; they are produced to supply a demand for a certain commodity at a certain price, just as in the case of any other trade.

The essential evil in this system, and that which is at the root of all the rest, is the keeping the real designer in the background; designing anonymously, as it were, and making the production of the design a mere incident of business. No designer will ever do his best, nor put his heart and his enjoyment into the work, when he is deprived of the recognition of his work by the public, and reduced to a mere designing-clerk; and it is almost needless to add that artists of any original and independent genius will never accept such a position. And nothing would do more to put new life and interest into our stained glass work than a resolution on the part of the public to refuse to order stained glass as goods, to insist on commissioning the design from an individual artist, whether a member of the firm or not, and letting him have the personal responsibility of and credit for his art. A cartoon for a window cannot be produced by a firm, it must be the work of one brain and one hand, to be worth anything whatever; and hence our objection to the exhibition, under the name of "art," of windows and window designs which bear only the name of the firm which deals in them, and not that of the man who has really designed them.

It has been suggested that this reasoning should apply equally to the case of architects who are in partnership, and that if we object to a firm for the production of stained glass we should equally object to a firm for the production of architecture. The subject is one on which there is certainly something to be said, though the case, as already observed, is not exactly a parallel one with stained glass. A stained-glass window, though a manufacturing process comes into its production, is a work produced for a purely artistic end; and the cartoon which gives the design is a form of pictorial art which must necessarily be the work of one hand. A

* We received one day a request from a firm of plumbers and sanitary appliance people to illustrate a window designed in and issued from their shop.

relation may be required for purposes in building to which architectural design is necessarily a secondary consideration; and even where this is not the case, the planning and supervision of a building require a good deal of knowledge and experience which is quite a different class of acquirement from that of artistic design. The combination of two minds in the production of a building is therefore not by any means so impossible or illogical a supposition as in such a case as stained glass design. It is obvious, for instance, that such a firm as MM. Fellner & Helmer of Vienna, about whom a good deal was said in our recent notice of the Vienna "Musical and Dramatic Exhibition," are simply experts in the planning and arrangement of theatres, who have acquired from long practice and study the power of arranging and carrying out theatres with unusual completeness and in an unusually short space of time. There is little enough of architecture in the higher sense, in all this; and considering how much scope for architectural treatment a theatre presents, how desirable and how fitting it is that a building which is the home of one form of art should itself be a work of art, it is lamentable to think how very little architectural art is usually displayed in the design and decoration of theatres. But the fault is with the public. A theatre is a very complicated kind of construction; the public wants above all to have theatres that are comfortable, well lighted, easy to see and hear in, and convenient and safe in regard to ingress and egress and protection from fire risk; and if it gets these it troubles itself little about the architectural design. The manager and proprietors want a theatre with all the best arrangements for scenic effect and for the convenience of the actors, and one which is economical in working; and they want it quickly, inasmuch as all the time occupied in the construction of the building represents expenditure without return. As these are the demands, it is not surprising that architectural firms are formed to supply them, and there can be nothing illogical in that case if the architects form a kind of company or syndicate to supply what is wanted. No theatres that are really works of architectural art will be produced in that way; but it is a matter of supply and demand; and the architectural art is not demanded, and if it were, there is hardly time to produce it.

This is an extreme case; but in a large proportion of the buildings which are produced there is necessarily a great deal to be considered besides the art of architecture. A corporation may very sincerely desire to have an architecturally grand or picturesque town-hall, but they also desire to have it conveniently planned and well drained, warmed, ventilated, and lighted. There is plenty of work for more than one head here, and it may even be urged that the best probability of such a work being adequately carried out would be where there were two partners in the architect's office, one giving his mind to the plan and design (which are not properly separable) and the other to the technicalities of ventilation, drainage, &c. It is not uncommon to put the arrangement of these latter into the hands of specialists outside the architect's office; but the whole is not likely to be so well or so economically carried out as when all the work is within the direct management and supervision of the architect or architects. This putting together of two minds for the production of buildings in which architectural and practical considerations are perhaps of almost equal importance, is one of the best excuses that can be given for the formation of architectural partnerships. This is a partnership for the more thorough carrying out of work. Other practical reasons which may be named in defence of architectural partnerships are a mutual benefit from economy in regard to offices and staff; or the case where one partner has capital, connexion, or business qualities, and the other has artistic genius. Either of these reasons may apply equally to

the case of a partnership for such work as stained glass; the only difference is the one already pointed out, that the latter is more directly and ostensibly a pure work of art, while, in the case of a building, the art is inextricably intermixed with utilitarian considerations. Of course in the case of the union of the man of business with the artistic architect it may be said that the latter is merely the "ghost" to the former, but then he is an acknowledged ghost who practically has the full credit for his work, for where such cases exist (and they are known to exist) it is generally pretty well understood who is really the architectural designer of the buildings. Our correspondent "An Artist," in another letter to us which we did not publish, suggests that there is no objection to architectural partnership where both partners are artists. It appears to us that there is less objection to it and more reason in it in the case we have just supposed, where one partner is the real artist and the other the practical man, because in such a case the part taken by each is easily apprehended and distinguished. Where there are two partners who are both artists, both actual designers of buildings and detail, we have again the old difficulty of loss of individual responsibility for a design. It is hardly possible that one architectural design can be rightly credited to two people, though there may be a certain division of labour in this case which is not possible in cartooning for a window: one partner, for instance, may have made the general design and the other may furnish the full-size sections of mouldings and the detail drawings for ornament; but the unity of expression of the whole, as a work of architecture, is hardly likely to be improved in that way; in fact, we cannot imagine any architect with a real care for his building allowing anyone else to design a single detail of it. In the case therefore where two men who are equally artists in their ideas and ambitions in regard to architecture enter into partnership from motives of economy, mutual assistance, or pure friendship, it appears to us that the only true course is to regard the partnership merely as an arrangement for convenience, economy, or companionship, and for each partner to keep to and to claim only his own work, and give up the fiction that the buildings are designed by "Messrs. Smith & Robinson"; and we believe that, among the younger generation of architects especially, there is an increasing feeling in favour of this view of the matter.

Under its usual conditions partnership in architecture is to a great extent the result of the modern demand for speed in the production of buildings; they are wanted to be "turned out quickly," and two heads, two purses, and a large staff can meet the demand more readily than single resources. For architecture this is a wretched condition of things, but it is no use to deny the facts, and the fault is as much with the public as with the architects. Still there are such reasons as we have suggested in defence or palliation of the system of architectural partnership. But we cannot deny that the system is one which is essentially at variance with the highest conception of an architect's calling. It is a system entirely of modern creation. In Gwilt's list of architects of former centuries we do not find records of the work of "Signori Scamozzi & Serlio," or "MM. Mansart & Perrault"; and we should have rather a different impression about that very individual architect Wren, if he had taken (say) a son of Inigo Jones into partnership, and if St. Paul's were credited in history to "Messrs. Wren & Jones." And it is impossible not to see that this question of partnership is not without its relationship to the question of Professionalism versus Art in architecture, about which so much is being said just now. While not without its valid reasons and excuses, partnership is a kind of arrangement which belongs essentially to the professional view of architecture. And in this

respect it is significant that out of the eleven architectural contributors to the hook we reviewed last week, in which at any rate a high standard of architectural art is set up, only two are partners (one of those in rather a modified manner). The other nine are independent artists, putting their own individuality into their work, and in this manner at least practically exemplifying their own principles.

THE PARLIAMENT HALL: EDINBURGH CASTLE.

THE fine old hall of the palace-fortress of Edinburgh has now been opened to the public, the key having, on the 18th inst., been handed over to the Princess Louise (on behalf of the Crown) by Mrs. Wm. Nelson, widow of the munificent restorer. This is the second important work of restoration which Edinburgh owes in recent years to the wealth and public spirit of her literary merchant princes, Dr. Wm. Chambers having restored St. Giles Cathedral a few years previously. Neither of these munificent citizens, unfortunately, lived to see the completion of his work; but it is not easy to conceive a finer method of keeping green a rich man's memory amongst his fellow-countrymen. For centuries the civic life of Edinburgh centered round the old High Kirk of Sanct Gil; and for a century and a-half at least, during the dynasty of the Stuarts, the life of the nation may be said to have centred largely in the "Magne Camera" of Edinburgh Castle. After the political union of England and Scotland in 1707 the hall must have fallen into disuse and neglect, until its very identity was lost sight of both within and without. Latterly it was used as the garrison hospital, divided up into floors and rooms; while, on the south side, whence once the Court had watched the gathering for Flodden, projected picturesquely (it must be admitted), but most incongruously, the hospital sanitary annex. Explorations in 1883 by Colonels Gore Booth and White, with Lord Napier and Ettrick, practically re-discovered the old hall, still existing in spite of defacement; and in 1886, Mr. Wm. Nelson, the publisher, who had just restored the Argyll Tower of the Castle above the portcullis gateway, undertook the complete restoration of the old "Parliament Hall." The work, entrusted to Mr. H. J. Blanc, A.R.S.A., has, it is needless to say, been exceedingly well done, the fine old mullioned and transomed windows to the north and south having been carefully deciphered, so to speak, and opened up; those to the south are characteristically double-transomed, and from the precipitous Castle-rock dominate the old city very nobly. At the east end the flue of the old fireplace was discovered behind modern building up, besides, it is stated, fragments of the old chimney-piece itself. These do not seem to have been incorporated in the massive new chimney-piece designed by Mr. Blanc, which is itself a fine and suitable piece of work. Exception must be taken, however, to the statue corbelled out from the great sloping stone-hood. Not only are they modern and somewhat incongruous in treatment, but they distinctly diminish the apparent size of the whole chimney-piece. Whether the carved corbels of Lillibowg and other fireplaces were for statue, or, as is generally supposed, for lamps, is perhaps a moot point; but the statues here seem scarcely a success, though in subject they are graceful and appropriate, being suggested by Dunbar's poem, "The Thirissil and the Rois." The walls are panelled in oak for some 14 ft., the upper panels being treated in rich perforated tracery. At the west end are the screens. The whole of the elaborate woodwork is treated in old Scotch character, but the lower part of the screens is robust almost to exaggeration. An interesting souvenir of the past is to be seen in the carved shutter-boards to the lower windows only, which were common enough in old Edinburgh, though it may be questioned if they originally had a place in

the Palace Hall. The old hammer-beam oak roof has remained as erected by James IV., requiring, it is stated, but a minimum of repair; both it and the walls are skillfully decorated. At the foot of the common rafters are small shields blazoned with the arms of the Governors of the Castle up to this century, which greatly relieve the somewhat too sombre trusses and lighten up the wall-head well. In the windows are blazoned the arms of the Scottish Kings, as also those of the Regents and the Scotsmen who have made their country's history. The shields are extremely well done, but the geometrical grisaille backgrounds are somewhat dull; they contrast not quite successfully with the brilliant, if rather confused, armorial window recently erected in the Montrose,—or Chapman,—aisle of St. Giles Cathedral.

The dais of the hall is not raised, this having been apparently its original condition; the old door remains that gave entrance to the Royal apartments in by-gone days, as well as the small eyelet hole that lighted a stair in the south-east angle. The hall has now been decorated with a considerable collection of armour, gathered by Major-General Lyttelton Annesley, but no pieces of this would seem to date back to beyond the end of the sixteenth century. It is hoped, however, that the College of Heralds in London will send the sword and dagger worn by the unfortunate James IV. at Flodden.

The fine old hall, as now handed over to the nation, is redolent of Scottish history. It dates from the time of James I., A.D. 1434, as attested by the Exchequer Rolls, though remodelled, perhaps, and re-roofed by James IV. towards the end of the fifteenth century. Mr. Blanc, however, believes the substructure to be much older, and it may, perhaps, reasonably be assigned to the time of David II. (about 1360), who built the gate tower, as it exists in part to this day. Here James II., the boy of six, was proclaimed King after his father's brutal murder at Perth in 1437; here, a few years later, he saw the young Earl of Douglas (a lad of eighteen) and his brother, and Sir Malcolm Fleming, treacherously seized and murdered by the Chancellor Crichton at the dreadful banquet of the Black Bull's Head. Here James III. must often have sadly languished, a prisoner. Here James IV., the re-builder, who began, too, the palace proper of Holyrood, held his wedding festivities with Margaret Tudor; his cypher is upon the corbels that support the roof to-day. Hence he watched the tourney on the "Barrack" many feet below (long since huilt over); and hence he saw his army muster on the burgh-moor to the south to march forth to the wreck of Flodden. Here James V., a little boy, must often have held high romp with his faithful tutor, Sir David Lyndsay, as recorded by the latter in some of the most touching of his verses. Mary of Scots, his daughter, was often here; in a room close by her mother, Mary of Guise, died in 1560; and, six years later, in a tiny room just to the eastern of the hall, was born James VI. Charles I. and Cromwell, Charles II. and the Duke of York, his brother, have all feasted within the walls that now have, thanks to the generosity of a private citizen, been restored to their former grandeur. It is deeply to be regretted that the great hall of Stirling Castle, as intimately linked as this with Scottish history, should still be abandoned to harrack use; at present it is as grievously defaced as was, till a year or two ago, the great Parliament Hall of Edinburgh.

ENLARGEMENT OF WESTON PARISH CHURCH, NEAR BRISTOL.—The enlargement of the Parish Church of All Saints, Weston, is now proceeding, and on the 18th inst. the corner stone of the new building was laid. The church is to be enlarged by a north transept, a south transept, and an extension of the east end, thus giving accommodation for 200 more worshippers. At present the church is provided with high box pews, which are to be replaced by modern seats. Mr. Harbottle, of Exeter, is the architect, and Messrs. Stephens & Bastow, of Bristol, are the contractors. The estimated cost will be about 4,000l.

NOTES.

IN the words of Artemus Ward, we may say that "the great American eagle is screaming all over the length and breadth of that bright and beautiful land," for a speech more full of American brag and "hunkum," and more essentially vulgar in what may be called its æsthetic tone, than that of Mr. Depew at the dedication ceremony of the Chicago Exhibition, it would be difficult to imagine. Even in regard to Mr. Depew's celebration of the social and commercial importance and the political stability of America, which are justifiable subjects of satisfaction up to a certain point, one cannot but reflect that the country has also the questionable distinction of having one of the most corrupt of all civilised Governments. But the artistic part of Mr. Depew's speech, judging from what the *Times* reports and what it appears to suggest in regard to the unreported portions, betrays an ignorance as to what constitutes the artistic greatness of a nation which we had really begun to think America had left behind. If we are to take Mr. Depew, however, as representing the national sentiment, it would seem that Americans, *en masse*, still believe that size makes the greatness of a work of art; that the fact of their meeting in a building larger than any that has hitherto been covered by one roof puts them on a pedestal above the Greeks, with their foolish little Parthenon; that the superior size of the Chicago Exhibition buildings over the Paris ones is a proof of their superior excellence, and that the Chicago Exhibition is to be the greatest and best that has ever been held because it is the biggest. We really had begun to think that America had been educated to a higher point than this; but it seems a delusion. There is a small minority of Americans, no doubt, chiefly those who have come under the influence of France, who understand what art means; and they will probably be among the first to laugh at Mr. Depew's heroics, which are not calculated to attract the more sober-minded and cultured Europeans to the Chicago function.

THE Board of Trade inquiry into the Canal Companies' rates and charges has not attracted so much attention as did that concerning railway rates, but it must be of considerable importance to many traders, nevertheless. The principal canal companies have lodged revised schedules in accordance with the terms of the Act of 1888, the consideration of which was commenced at Westminster Town Hall in May last. On that occasion fourteen sittings were held, and only two schedules disposed of prior to the adjournment; and the proceedings were resumed before Lord Balfour of Burleigh and Mr. Courtenay Boyle on Monday last. The companies appear to have acted upon the principle of making good provision for a rainy day, for the tolls proposed in some of the schedules would bring the charge for canal transport up to a higher figure than the rates recently authorised for railways. We do not know how far the charges hitherto made by canal companies may be below their existing statutory powers, but these charges are very much lower than those proposed in the schedules. The effect of the Inquiry will doubtless be to considerably curtail the "margin for contingencies," as was done in the case of the railway schedules. This week's proceedings commenced with the consideration of the Birmingham Canal Co.'s schedule, after which comes the Warwick and Birmingham Canal, and then the Regent's Canal; but as certain questions have arisen necessitating a conference between the Railway Association and representatives of the traders, it appears probable that the inquiry will still occupy a considerable time. The extent to which railway companies can legitimately influence canal charges seems likely to enter largely into the question. The Birmingham Canal Company, for instance, is guaranteed a dividend of 4 per cent. by the

London and North-Western Railway, who have the right, under an Act of Parliament, of determining whether any of the authorised canal tolls shall be reduced.

THE Turners' Company's annual exhibition of wood and pottery hand-turning, which has been open at the Mansion House for three days this week, is the twenty-third successive one that has been held. The exhibits were arranged in the hall-room, and comprised many articles of wood turning in hard and soft woods, and articles of pottery, either terra-cotta, stoneware, earthenware, or porcelain, which were required to exemplify pottery thrown on the wheel, turned pottery, and turned pottery ornamented with incised work or glazed or coloured. The list of prizes was an exceedingly good one, and has been contributed to by the Court of the Company and by individual members of the Court. The Baroness Burdett Coutts offered 20*l*. The award of prizes in the wood turning rested with Messrs. J. J. Holtzapffel, Howard W. Elphinstone, R. C. Rapier, and A. H. Bevan; whilst the judges of pottery were Sir Douglas Fox, Colonel A. J. Copeland, Mr. Wm. Brindley, and Mr. J. C. L. Sparkes. The work submitted is mostly that of workmen or their apprentices, and the pottery exhibits are more numerous than those of wood. It is to be hoped that another year more space may be found for the exhibition. The difficulty of examining the merits of large vases placed three deep on a flat table is great, and it is only due to competitors that their works should be properly shown. The character of the work is very varied, and the really excellent exhibits are comparatively few. In the pottery division want of proportion and bad outline are too often conspicuous; whilst in the wood turning, in too many instances, difficult and tricky workmanship appears to be aimed at rather than the attainment of beauty by more simple methods. Amongst the wood exhibits the first prize has been taken by Mr. J. Lewinton, for a graceful pair of tripod lamp stands and a pair of flower vases ornamented with inlay. In the division for pottery the judges decided not to award the first prize in Class A, because the knowledge of form and proportion displayed appeared to be inadequate. In Classes B and C the work was of a better character, and some very good work in inlaid clays and mottled clays were noticed. A potter's table formed an interesting part of the exhibition, and Mr. Askew excited much interest by his admirable execution of turned potter's work. We foresee a great future for this kind of exhibition in encouraging the craftsman; and in our opinion too much care cannot be bestowed by the authorities in encouraging the workmen to work to true artistic principles.

THE question of the date and significance of the "Apollo Belvedere" is a well-worn one, but it will probably never cease to interest both artists and archaeologists. Dr. Winter, in the current number of the Prussian archaeological *Jahrbuch*, offers what seems to us a valuable contribution to the literature of the subject. Setting aside the question what the precise action of the figure is,—i.e., whether the god is shooting a bow or shaking an agis,—he examines the pose,—we might almost say the *poise* of the statue. The most casual observer must have noted the extraordinarily airy gait of the god; the way he seems rather to fly than to walk. It is, indeed, to this peculiar poise that much of the dignity and grace of the figure is due. Recent investigations have shown with increasing clearness how successive advances in the art of sculpture among the Greeks were marked by successive masteries over postures of increasing difficulty. Polykleitos throws the weight of the body on one leg, Pheidias achieves a figure flying down. Dr. Winter points out how Leochares (in his statue of Ganymede and the Eagle) devoted his efforts to the figure flying up; and the juxtaposition of the Ganymede and the

Apollo show convincingly how the whole pose of the Apollo is inspired by this upward motion. The original of the Apollo was, Dr. Winter holds, due to the impulse given by Leochares.

IN the course of a paper read at the meeting of the Salford Royal Museum and Free Libraries Committee on Tuesday, Alderman W. H. Bailey gave the following information as to the working of the Technical and Industrial-Art Libraries of Paris, which we recommend to the attention of those concerned in the management of similar institutions in this country:—

"These libraries, also under Municipal control, are in the artisan districts of Paris; at present there are ten in number, some of which, however, are only sections or departments of the other free libraries which I have just described. Book patterns, prints, drawings, and photographs are lent out; the chief aim of the administration has been to keep on the shelves of the library material in the shape of books and engravings of interest to the particular trade of the district; for instance, in one district we visited, cabinet-making seemed to be the chief occupation, and in the library there nearly everything of utility or beauty made of wood and perpetuated in the pages of any literature to be found on the shelves, which can be made valuable to the poorest man who has to earn his living by making graceful furniture.

The most important of these institutions is the Forry Library, founded in 1886 by a legacy of 200,000 francs presented to the City of Paris by H. Aimé Sauvaire Forry. By means of bequests from other private and public sources this institution has become of great value as a general institution for the promotion of industrial art. It has two departments, one for lending out books and designs for home work, and the other department in which specimens, models, and illustrations of great value may be copied in the building itself.

The peculiar feature of these industrial libraries is the manner of distributing thick costly books of plates of ornamental design, which are often very heavy, and for the most part contain information beyond the scope or desire of the borrower. These are cut up and divided into a number of books; all those relating to iron and metal are put between cardboard backs of a certain colour; those relating to textiles and embroideries in other backs; architecture in others, and so on. The colour of the cardboard backs indicates the class of design; frequently one volume is made into twelve or more, and thus a book is made of great utility with an increased circulation by this simple method."

WE are glad to see that the London County Council has been urging on the various local authorities of the metropolis the necessity and importance of providing public mortuaries and Coroners' Courts where such conveniences do not exist. A committee of the Vestry of Mile End Old Town has just reported recommending that "having regard to the letter of August 10, 1892, from the London County Council, with reference to providing a Mortuary and Coroner's Court in the district, your Surveyor be instructed to report on suitable sites for that purpose, and also for the purpose of a mortuary only."

WE are becoming accustomed to see a very varied programme at clerical congresses: in fact, having regard to the clear and well-ascertained methods of clerical work, which need no pointing out, it is, perhaps, allowable to suggest that more work and less speech would be desirable. If, however, all kinds of subjects are to be introduced at clerical meetings, the members of the Uxbridge Ruridecanal Conference may be congratulated on the fact that the reading of a paper on "The Housing of the Poor in Agricultural Districts," and a discussion thereon, occupied the main part of the time of the Conference. The paper appears to have been a plain and sensible explanation of the chief sanitary requirements of a cottage-home, as was natural from the fact that Mr. Roberts, who read the paper, is a Medical Officer of Health. But the exposition of these well ascertained truths, which require to be daily pressed on the attention of clergy and laity alike, in a popular meeting, is of the utmost use. We should be glad to see clergymen place themselves more in the forefront

of the sanitary movement. No class of men can do more than they in impressing on cottagers and others the value and necessity of following a few plain elementary rules of sanitary science. Many of the parsonages in rural England, however, are, we regret to say, very imperfect in sanitary details, and, like charity, sanitation should begin at home. But that makes such papers and discussions as the above of still greater value.

A CORRESPONDENT of the *Times* suggests in that journal the desirability of a Parliamentary inquiry into the working of the Acts relating to building societies. As the Legislature so long ago began to regulate building societies by Act of Parliament, the principle of legislative interference in their management has long been an established fact. It is equally clear that a number of these societies have not been prudently managed, and a large number of persons have consequently lost the savings of many years of labour. A case is thus clearly established for a Parliamentary inquiry with a view to the amendment, if necessary, of the Acts affecting such societies.

GERMAN architects have recently been invited by Herr Krupp, of Essen, to compete for designs for a large number of artisans' dwellings he wishes to erect near his great iron-works. They are intended for invalid workmen and pensioners, and not only are they to be practical in plan, but it is required that they should also be pleasing in design and architectural appearance. According to statistics of 1888 Herr Krupp employed a staff of 20,960 men on his works that year, who together with their families formed a colony of 73,769 persons. Of this number 12,723 lived in houses owned by the heads of their respective families, and 24,193 in tenements rented from Herr Krupp. This great employer of labour has by this time built every class of home for the different grades of members in his staff, from the villas for his senior officials, placed in a fashionable road, to the simple barracks for the unskilled bachelor labourer. A tour through his extensive estate will show the visitor every kind of philanthropic institution, technical and elementary schools, co-operative stores, fire department, &c. The enjoyment of his workers is provided for in the officials' *casino* and in the subsidised theatre lately opened; nor are a stranger's wants uncared for, as he will find a good hotel of model management. Throughout Herr Krupp's large property at Essen, murky as it is, there are, however, ample proofs of energetic and systematic attempts to beautify the worker's home and leisure surroundings as far as is practically possible by means of simple architectural decoration; and if now, after reading the competition regulations for the proposed dwellings, it strikes the business-man that Herr Krupp is, perhaps, excessively liberal, it would be well to refer him to a financial statement which shows that, in spite of the architectural treatment, such houses can be built to bring in an income of 2 per cent. on the capital sunk, and that Herr Krupp can derive a fair return from his philanthropic erections without neglecting architectural embellishment.

SIR EDWARD WATKIN, who appears to be able to secure Mr. Gladstone to advertise his railway projects whenever he desires, in spite of the Prime Minister's public engagements, had one of his show days last week, when Mr. Gladstone cut the first sod of the Wirral Railway, which is the last link to be completed in order to finish the line of railway which will directly connect Wales and Liverpool. There is no doubt that this connexion of Wales and Liverpool is one of considerable importance, but we can scarcely regard it as one of such importance as Mr. Gladstone would seem to suggest. It will undoubtedly give the inhabitants of Liverpool quick access to the watering-places of

Wales, and will thus give some impetus to trade on the coast line of Wales. Mr. Gladstone spoke of the communication "with Liverpool and all that lies behind it." But behind Liverpool there is nothing but the coast line if we look at this port from the estuary of the Dee. The real line of communication between industrial Lancashire, other than Liverpool, and Wales, is by way of Runcorn. The bridging of the Mersey at that place was a more important achievement for Lancashire generally than Sir Edward Watkin's enterprise, though the latter, after his manner, has taken care to advertise his scheme.

PROFESSOR ADLER, we hear, intends to resign his appointment under the Prussian Office of Works, on account of failing health. Besides attending to the publication of the further volumes of "Olympia," he will devote some time to the completion of his great "History of Architecture," which will fill a gap in German architectural literature.

IN a "Note," on June 14, 1890, we adverted to the removal into No. 3, St. James's-square, of the Portland Club, which was established at No. 1, Stratford-place, Oxford-street, after the dissolution, in January, 1825, of the Stratford Club, formed, we believe, in or about 1780. The club-house in Stratford-place has lately been pulled down for the building of new premises for a branch of the London and Westminster Bank, as planned and designed by Mr. F. W. Hunt, of York-place, architect. Stratford-place stands upon part of the Conduit Mead estate as leased by the Corporation of London, and, according to a drawing in the Grace collection, Robert Adam built the house along its northern side for Lord Aldborough in or, rather, about 1774. A drawn ground-plan, dated 1770, in that collection, marks the house at the south-west corner as being Lord Aldborough's. Conduit Field, of twenty acres, to the west, passed to J. T. Hope, on his marriage with Helen, daughter and heir of Sir Thomas Edwardes, Bart., and thereon were built Somerset, Edwardes, and Duke streets, with Geese-court, Barrett-street, Barrett-court (now St. Christopher's-place), &c. Conduit Mead extended from Stratford-mews, next southwards of Wigmore-street, to the Clarendon and Burlington properties. It includes Ilay-hill, Grafton-street, the two sides of Bond-street, with portions of Albemarle and Conduit streets. General Strode, who set up in Cavendish-square an equestrian statue to the Duke of Cumberland, put up in front of Aldborough House (1799) a Corinthian column, 20 ft. high, to carry a statue of George III., and inscribed it in commemoration of our victories in India and at sea; the foundation giving way, the pillar was removed six years later. It stood very near to the site of the "Lord Mayor's Banqueting House," that had remained until 1737, whither the Corporation used to repair annually, on September 18, after their visit to the several conduits in this quarter, whence water had been taken to the City from a very early period. In his book upon Marylebone parish, 1833, T. Smith says:—

"The water-pipes . . . were not always embedded in the earth as is the present custom, but enclosed within a capacious arch of brickwork, on a table of stone, into which workmen could descend to repair any decay or accident. An arch of this description was discovered some years ago in Bond-street, leading from the conduits at Tyburn . . . and has since been converted into a sewer."

We are credibly informed that an arch of the fashion he describes has been found beneath the pavement in Oxford-street, by the corner of North Audley-street; at a spot where a conduit-head formerly stood.

THE exhibition at the gallery of Messrs. Tooth & Sons in the Haymarket, includes two or three notable works, among

others a grand painting by Rosa Bonheur of a lion, lioness, and cubs, life size, under the title "The Lion at Home." The group is very finely composed, and though there is nothing of the sentiment which some painters have endeavoured to infuse into animal paintings, the picture is impressive from the mere grandeur of its realism and from the power of drawing displayed in it. Another work on view is Mr. Tadema's large and fine painting of "The Sculpture Gallery," which has not been seen in public for some years. Sir J. Millais' "Lingering Autumn" (the Academy picture of this year) flanks Rosa Bonheur's lions on one side, a good landscape by Mr. Farquharson, "Santon Marsh," forming a pendant to it. A picture of "A Breton peasant," by M. Dagnan-Bouveret, painted in a somewhat decorative manner, is remarkable for originality both of character and colour.

WE have received a letter from a provincial architect in reference to our "Note" (page 297, ante) about the issue of illustrative broad-sheets of their works by provincial architects, complaining that we should have implied that "provincial architects" were especially guilty in this kind of thing. We can only say that we have two or three times received these advertising sheets from architects well-known and having a large practice in provincial towns, and we never saw such a thing from a London architect of anything like the same professional standing. What some London architects can do, however, our correspondent shows by a letter he sends us, of which the following is a skeleton copy:—

"DEAR SIR,—We understand there is to be a competition, confined to architects in ———, for a [description of building] to be erected by the Corporation. We should like to know if you intend competing and if you care to avail yourself of our services on terms to be arranged.

We are architects for the similar building erected by the ——— Corporation, which has been taken for a model in several other towns, and we have probably more experience of this class of work than any other firm. Should you consider this favourably, kindly let us know at once.—Yours faithfully,

Our correspondent wishes to know whether this is "recognised London practice." He may be assured that it is not, and that no London architect of the best standing would dream of sending out a touting letter of that kind. Our correspondent declares that on a local competition being advertised they are deluged with offers of a similar nature; but that we take to be a little exaggeration. At any rate the document sent to us is the first of the kind that we have seen. It is, however, very discreditable that such letters should be written by members of a profession ("or art") which ought to have as high a code of self-respect as the legal profession, for instance; especially when we find that the writers are sheltered under the wing of the representative professional body; for the issuers of the illustrated sheet previously referred to (who describe themselves on their letter-paper as "architects, surveyors, valuers, and estate agents") are both Fellows of the Institute, and the authors of the letter of which we have given the substance above are both Associates of the Institute. Surely the Institute, as the representative professional body, should endeavour to prevent its accredited members from doing what in any other liberal profession would be considered distinctly "unprofessional."

THE ENGLISH IRON TRADE.—There is still little alteration of note in the English iron market. The crude iron branch is inactive. Prices generally are fairly steady, but Cleveland pig is 1s. lower on the week, and one or two Scotch brands are depressed. In manufactured iron there is only a hand-to-mouth business reported. In tin-plates, although there have been further stoppages of mills, the demand is a trifle better. In most departments of steel little activity is observable. Shipbuilding yards are only just kept going, and engineers and iron-founders, on the whole, lack employment. The coal trade is moderately brisk.—Iron.

AN ARTISTIC PIANO.

FOR the last few days Messrs. Broadwood & Sons have been exhibiting a pianoforte of unusual exterior beauty and elaboration, made from the designs and specification of Mr. T. G. Jackson. It is almost needless to say that its design has nothing in common with the meaningless curves and decanter-stopper legs of the ordinary type of piano-case. The main lines are square in character, following the construction, the legs are designed as colonnettes in couples, with a baluster between them, resting on a solid base-plate in which are fixed the castors. There is an expression of strength combined with gracefulness in these supports, which give the whole construction the appearance of being solidly and architecturally built. The outside of the case is veneered with purple wood, stained a dark green, the combination of the natural wood and the stain producing a peculiar rather dead black, quite different from the ordinary black of ebony, and much less pronounced in effect.

The sides of the case and the outside of the lid are inlaid with scroll ornament in elaborate and beautifully-executed intarsia work, mostly in satin and pear-tree wood. On the side are inserted at intervals escutcheons with a short quotation of music. These escutcheons, we were rather surprised to see, are slightly shaded to give a certain effect of relief, which we do not like and which seems out of keeping with the purely decorative and conventional character of the design in general. The inner side of the lid, which shows when it is propped up, is very richly treated with a beautifully-designed scroll-work, rather more realistic than that of the exterior, but quite sufficiently conventionalised; this is executed in gesso on a ground of lacquered vermilion. The whole instrument is a beautiful piece of work, very rich in effect, but a due restraint is preserved in all the ornament. The treatment of the music-desk, with its simple straight bars and centre inscription panel, is a refreshing contrast to the usual "lyre" shapes and curvilinear twistings of fret-work; but the method of designing the supports is the greatest merit of all, and ought to be an example for the future building of pianos; for pianoforte-makers will discover, (if they can only bring themselves to break through precedent) that properly-designed supports like these can be carried out, as far as general form and design are concerned, in a simple and inexpensive case just as well as in one with costly decoration, and that there is no need they should cost any more than the regulation decanter-stopper legs. We remember pointing this out to some of Messrs. Broadwood's people two or three years ago, when looking at another specially-designed piano, and asking them why they did not try a better design for the legs than the usual ugly one; and the reply was that if they began to do that they would have to remodel the whole case in accordance with the new leg, and they could not afford to do it at the ordinary price of a piano. Now, however, the same firm seems to have discovered that it is possible, after all, to make ordinary pianos on the principles of correct and sensible design, as we were shown two or three comparatively plain ones built on the same principle as in Mr. Jackson's design, which, as it has been two years in process of making, has probably given the hint for this improvement.

There is one portion of the supports of the piano, however, which we do not quite like viz. the twisted and irregular outline of the oblique struts which assist in strengthening the main joint of the piano. As these are part of the construction, introduced for the purpose of strength, we cannot see why they alone should exhibit a florid and curvilinear outline which seems sternly banished from the rest of the design. There is also one other detail we should take exception to not on artistic but on practical grounds, and that is the decoration of the "black" keys by inlaying the top of them with ivory, forming a black and white rib-work. The effect is decoratively good, and it is no doubt a revival of an ancient practice, but it is at variance with the real object of the keyboard, in which the plain black and white keys are far the clearest and pleasantest to see and handle. In fact the system of decorating the keys belonged to a time when playing was of a very simple kind, and has been naturally dropped with the progress of pianoforte-playing, when the fitness of the instrument for its purpose came to be the primary object; and that object should never be overlooked in designing and

decorating a musical instrument. The keyboard is the *raison d'être* of the piano, and whatever decoration may be lavished on the case, the sole end in designing the keyboard is that it should be the best possible colour, shape, and material for playing on, and what is that "best" has been settled by the general consent of the pianoforte-playing world for many years back. The same principle applies to the design or decoration of all musical instruments, and is illustrated in the history of the violin as much as in that of the piano. In the very early days of violin-playing, and before the instrument was fully developed, elaborate carved and inlay ornament was frequently lavished on it. But, as soon as violino-playing began to be an art studied and followed seriously by musicians, these ornaments disappeared, and nothing was introduced that could in any way distract the eye or the attention of the player from the real business in hand. This is what occurs in every case where the handling of an instrument becomes an object of refined manual skill, only acquired by special training. All ornament which in any way interferes with the practical use of an instrument becomes an impertinence, and is at once scouted by a competent player. Let any one try the experiment of presenting an eminent violinist with an elaborately decorated violin, and see if the gift will be appreciated. So emphatically is this principle true that we should expect to find that the lady and gentleman for whom Mr. Jackson has designed, and Messrs. Broadwood have made this finely-decorated instrument, if they have acquiesced in this treatment of the keyboard, are not after all persons of very strong musical sympathies, and that they regard their beautiful pianoforte rather as an *objet de luxe* than as a musical instrument.

THE ARCHITECTURAL ASSOCIATION.

The opening meeting of this Association for Session 1892-93 (which was also the annual general meeting) was held on Friday evening, October 21, in the meeting-room of the Royal Institute of British Architects.

Annual Report, &c.

Mr. H. O. Crosswell, the President, occupied the chair, and the first business after the confirmation of the minutes of the last meeting of last Session was the consideration of the annual report and balance-sheet, the adoption of which was moved by Mr. F. T. Baggallay and seconded by Mr. Hampden W. Pratt. The annual report of the Committee expressed satisfaction that the results of the new scheme of education introduced last Session had been, on the whole, encouraging. The First and Second Years' courses had been very well supported, but the Third Year's course had been very thinly attended; while, owing to the lack of students, part of the Fourth Year course was not started. The success, financial and otherwise, of the first Two Years' courses was encouraging, and it might be expected that the students who had attended those courses would now pass on to the more advanced courses, thus leading to their success also. The comparative failure of the Third and Fourth Years to attract sufficient students need cause no uneasiness: there were sufficient causes to account for it. The success of the Association had not been retarded by the doubling of the subscription and entrance-fees, as ninety-eight new members had been elected during the Session. The new scheme was not expected to be self-supporting in its early stages, and to provide adequate funds it had been necessary to issue appeals, to which there had been a liberal response.

The balance-sheet showed an expenditure for general purposes of 1,632*l.*, a sum 128*l.* in excess of receipts. These included 639*l.* for members' subscriptions, 180*l.* for entrance-fees, and 813*l.* for students' fees. The Premises and General Fund Account showed donations amounting to 991*l.*, of which 300*l.* had been spent on alterations to premises and in the purchase of furniture and fittings. After meeting the deficit of 128*l.*, already mentioned, and cost of printing, &c., a balance of 480*l.* is carried forward.

The report and balance-sheet were adopted, coupled with a vote of thanks to the auditors, Messrs. E. C. Pinks and B. Dicksee.

Mr. E. S. Gale announced donations towards the General Fund of 13*l.* from Professor Kerr

and 10*l.* from Mr. E. P. Warren; also a donation of some furniture and casts from Mr. Wyatt Papworth. A vote of thanks to the donors was carried by acclamation.

On the motion of the President, a vote of thanks was accorded to the Entertainments Sub-Committee and to Sir Somers Vine for their services in connexion with the recent *conversazione* of the Association at the Imperial Institute.

Forty-six gentlemen were nominated for election, and three (Messrs. H. R. Mscaulay, R. Oldham, and L. Banks Price), having been previously nominated, were elected.*

Price-List, Session 1891-92.

The President said that before he announced the awards of prizes for the past session, he had to make an apology on behalf of the Committee. They had hoped that the Association Medal, which was to be given this year, and which was being modelled for them by Mr. Gilbert, would have been on view that evening. Unfortunately, pressure of other work had prevented Mr. Gilbert from completing it in time. Mr. Gilbert, he believed, was at present engaged on a memorial of the Duke of Clarence, and he had received a Royal request (which was equivalent to a command) that the work should be finished by a certain date. He (the President) was told that the medal would be a charming work, as, of course, they would all expect; and Mr. Gilbert had very generously undertaken to model the medal for the Association free of all charge. Under the circumstances the Committee had thought that those who were to be recipients of the Association Medal would prefer to wait for the new Medal than to receive the old one.

The list of prizes awarded during the past Session was then read. It was as follows:—

The A.A. Travelling Studentship, with Bronze Medal: Awarded to Mr. T. A. Sladdin. A second prize of 5*l.* awarded to Mr. E. A. Rickarda.

The Association Medal, with a prize of 10*l.* 10*s.*: Awarded to Mr. A. H. Clark. A second prize of 5*l.* 5*s.* (special) was taken by Mr. A. H. Moore; and Hon. Mention was accorded to Mr. W. A. Forsyth.

The Discussion Section Prizes: First, not awarded; special second prize (1*l.* 1*s.*), awarded to Mr. J. C. Stockdale.

The Arthur Cates Scholarship: Awarded to Mr. W. C. Waymouth.

Measured Drawings Prize: Awarded to Mr. A. J. Roddis.

The Andrew Oliver Prizes: First prize not awarded; second prize (2*l.* 2*s.*) awarded to Mr. A. Stratton.

Lecture Side: First Year: Silver Medal to Mr. F. S. Hammond; Bronze Medal to Mr. G. E. Boys; Hon. Mention of Mr. E. Tylee. *Second Year*: Silver Medal to Mr. C. C. Brewer; Bronze Medal to Mr. J. E. Stark; Hon. Mention of Mr. B. H. Hunter. *Third Year*: Silver Medal to Mr. N. R. Smith; Bronze Medal to Mr. A. J. Johnson; Hon. Mention of Mr. W. K. Shirley.

Studio Side: First Year: Silver Medal to Mr. R. F. Summers; Bronze Medal to Mr. E. G. Cummins; Hon. Mention of Mr. E. G. Simpson. *Second Year*: Silver Medal to Mr. J. P. Clark; Bronze Medals to Messrs. A. Stratton and F. Taylor, and bracketed equal; and Hon. Mention of Mr. C. C. Brewer. *Third Year*: Silver Medal to Mr. C. C. Winnill; Bronze Medal to Mr. W. C. Waymouth; Hon. Mention of Mr. A. T. Wainisley.

The late Mr. James Fowler.

The President referred in feeling terms to the death of Mr. James Fowler, of Louth, whose loss, he said, would be deplored by everybody who knew him. He moved that a letter of condolence be sent to the widow and family. This was seconded by Mr. Cole Adams and agreed to.

Gift of a New Prize.

Mr. E. S. Gale announced that Mr. James Brooks had offered a prize, value 10*l.* 10*s.*, open to all members of the Association, for the best set of measured drawings of one bay of the choir of Christ Church Cathedral, Oxford. A cordial vote of thanks was accorded to the donor.

The President's Address.

The President then proceeded to deliver the opening address of the Session. He devoted the first portion of it to a review of the results of the first year's working of the new educational scheme of the Association. Talking the Classes and Lectures first, he said that the total number of full students who joined the First Year's course was thirty,—“full students” being those who paid the inclusive fee entitling them to take up all the subjects in that year. In addition to these there were a certain number who did not take the

* When the 46 nominations become elections, as will no doubt be the case at the next meeting of the Association, this will bring the total of the Association's roll of members to 1,174, so that before the end of the Session it will probably exceed 1,200.—Ed.

whole, but joined only certain classes or lectures, and these were described as “occasional students.” The number of full students varied in the different subjects, but the largest number in any one class was twenty, and this was in the Lectures on Materials and Construction. In the “Second Year” there were eight “full students” taking the whole course, and of “occasional students” the largest number attending any one class was ten,—in the Course for the Study of Ornament and Colour Decoration, “English Architecture” coming next. In the “Third Year” there were six “full students,” and the largest number of “occasional students” was eight, in the Course for Specification-Writing and Quantity-taking. It was intended to start a “Fourth Year” course if sufficient students sent in their names, but as the number of these was not large enough, in the opinion of the Committee to justify them in doing so, that course was not held last Session on the Lecture Side. This was no ground for discouragement, however, because so long as there was a steady supply of students coming in at the bottom, there would be sure to be plenty to fill the classes at the top in future years. On the Studio Side, the proportion of students in the junior years, as compared with the senior, was very similar to that of the Lectures and Classes. Financially, the result of the first year's working was most satisfactory than was at one time anticipated. They had always expected that for the first year or two, and until the scheme was properly founded, the number of students would be insufficient to enable all expenses to be met out of the fees received. That had proved to be the case, for although on the First and Second years a profit had been realised, it was all swallowed up by the loss on the Third and Fourth years, leaving a loss of about 200*l.* Towards the outlay necessitated by obtaining new premises and furniture, they had appealed for funds, and their appeal had been generously responded to by many of their own members and others interested in the work of the Association, the amount received in donations to the General Fund being to the present time being about 1,000*l.* Having referred to some alterations in detail which have been effected in the working of the educational scheme as the result of last year's experience, the President touched upon other phases of the work of the Association, and then proceeded as follows:—

Turning now from the work of the students to matters of more general interest, I must say a few words on the subject of the differences which marked the close of last Session, and which at one time threatened to cause a serious split in our ranks. Although in the heat of the controversy much was said and much was written on both sides, which in calmer moments one would “properly regret, yet I am happy to think that wiser counsels have prevailed, and the good sense and moderation of both parties has shown them that by the exercise of a little tact and consideration for the opinions of others, each can learn something from the other, and that more good can be achieved by their united action than by a blind and unreasoning hostility. I trust that all feeling animosity has passed away, and that we shall have the cordial co-operation of all members for the welfare of the Association in the future, as we have had in the past. At no time of its existence has this Association more needed the strength which is the result of united action, standing as we do on the threshold of a new departure in our history; and should there be any who still hold aloof or nourish any feelings of resentment in consequence of what has occurred, I would earnestly beg them to put all such feelings aside, and sink their private wrongs for the sake of the Commonwealth, for we require the support of all. I should not wish referred to our little differences at all on this occasion had it not been that among the questions which were raised in the course of the dispute were some which were of vital importance to this Association, and not only to this Association, but I venture to think affecting interests of a wider range even than that. In consequence of our having endeavoured to do something to systematise the course of study for architectural students, we have been accused of degenerating into a mere cramming-ground for the Institute examinations.

Cramming, as I understand it, is the operation of forcing information into a man at high pressure so as to enable him to acquire just

efficient to pass an examination in a given time, and is, as a rule, only necessary for those who have not availed themselves of the ordinary means of instruction. It has been very properly compared to the system adopted in Strasburg for producing *pâté de foie gras*, and which consists in keeping an unfortunate goose fastened up in a coop and stuffing food into it until it produces disease of the liver. I hardly think that the term "cramping" can be properly applied to a course of instruction which is spread over a period of at least four years, and which may be spread over a longer period still at the option of the student. Anyone who will take the trouble to read the advice to students printed in last year's Brown Book will also find it stated that the course is expressly designed for the purpose of preventing the necessity for cramming, and the student is directed not to attempt to go through the whole course in four years, unless he is able to devote certain amount of time in each week during the day for the purpose of reading the books referred to in the various lectures and for private study. I think, therefore, that the term "cramping" is altogether misapplied in speaking of the A.A. course of instruction.

Then as regards the question of preparation for the Institute Examination. The primary object we had in view in laying down the new curriculum, and the object which the Association has always had in view, was to afford an opportunity for acquiring instruction in those subjects which, coupled with the experience to be gained in an office, would fit a man for his work as an architect; but, at the same time, we felt bound to take notice of the examination tests imposed by such bodies as the R.I.B.A., the R.A., and other kindred societies for the admission of students to membership or to their schools, and I think had we not done so we should have failed in our duty to our students and to ourselves. Whether the Institute should or should not impose an examination upon all those who desire to be admitted within its ranks is a question to which I do not propose to enter here—farther than to say that it appears to me that every society has a perfect right to dictate its terms upon which it will admit members. The point that we as a teaching body have to consider is the fact that the Examination exists, and that many of our students come to us for the express purpose of acquiring the information in our classes or studio necessary to pass it. We neither seek to induce them to go into it against their will, nor do we try to dissuade them from it if they have made up their minds to do so; the student has perfect freedom of action, and if he desires to go in or the Examination we believe that he can obtain all the information necessary in our classes. If, on the other hand, he does not wish to do so he can take up as much of the course as he thinks necessary or suitable to the particular bent of his genius. The Association is essentially democratic in its institutions, and leaves perfect freedom of action to each individual, so long as he does not interfere with a like liberty to his neighbors.

Again, it has been said that by accepting a contribution from the Institute towards our funds we have sacrificed our independence, and handed ourselves over to that body hand and foot. If I had thought for one moment that accepting a grant implied any such thing, for one should most certainly have voted against it; but I do not believe it, nor do I think that anyone else who knows anything either of this Association or of the Institute would believe it. There is, so far as I know, no feeling of hostility between us; on the contrary, we are the best of friends, and I hope may remain so; but we, as an Association, are jealous of our independence, and he would be a bold man who would propose any measure calculated to infringe it. Self-help is one of our guiding principles, and self-government is inseparably connected with it; and though this Association has been in existence for nearly fifty years, during which time it has assisted in educating hundreds of young architects, I think it has reason to be proud of the fact that until last year it had never appealed to those outside its own ranks for pecuniary assistance, and it only did so then because it was endeavouring to found a scheme of education on a much wider and more comprehensive basis than had ever been attempted before, and which required a larger outlay of capital than it had at its disposal. But, gentlemen, though the Institute, as the chief architectural body of

the kingdom, responded generously to that appeal, it is not to members of the Institute alone that we are beholden for contributions to our funds. Among the list of subscribers are to be found such names as that of Mr. Norman Shaw, Mr. T. G. Jackson, Sir Arthur Blomfield, and others, gentlemen who are strongly opposed to the policy of the Institute, and who, for want of a better title, have been called the "Memorialists." We are equally beholden to these gentlemen for their assistance, but I would ask whether it is urged that by accepting their contributions we have sacrificed our independence and handed ourselves over bound hand and foot to them also? If so it would appear that we have handed ourselves over to both parties, which is absurd. The fact of the matter is that the traditional policy of this Association has always been not to mix itself up in architectural politics at all, but to hold aloof entirely from all such matters, devoting itself to the education of its students and the promotion of good fellowship amongst its members, and hence it is that in the past we have had the cordial co-operation of all those interested in the progress of architecture, no matter whether they be members of the Institute, of the Royal Academy, the Society of Architects, or of any other body. Gentlemen, I trust that by a continuance of this policy we shall have an equally wide support in the future. There has been in the past one platform upon which all these men could meet, and that was the platform of education. It seems to have been tacitly admitted that, however divergent their views might be upon the burning questions of the day, they were all prepared to admit that some education was necessary for young men who wish to become architects, and that it is seldom, if ever, that all that is necessary can be obtained in the routine of an office. They may differ in the future, as they have in the past, as to the relative importance of various subjects and the precise means to be adopted of teaching them, but on this question the Committee are, and always have been, open to receive suggestions from whatever quarter they may come, and to give them due consideration with the object of embodying them in the course if it is thought desirable, so far as is practicable in the limited time at the disposal of the students. I appeal to all those, therefore, who are interested in the progress of architecture, to sink their differences, and to give us the advantage of their advice and co-operation in carrying on the work of this Association, irrespective of their belonging to any particular society or not. This is the basis of support upon which we have rested in the past, and upon which I trust that we may also rely in the future.

I think that we are all agreed that the education of architectural students in the past has been of a most haphazard and imperfect description. Here and there brilliant geniuses have stood forth in spite of the system, shining like beacon-lights in the general gloom, and only serving by their brilliance to make the surrounding darkness seem the blacker; but courses of instruction are not arranged to suit the genius. He is a *rara avis*, usually most erratic in his habits, and may be left to soar aloft on the bright wings of his imagination, untrammelled by the conventionalities of everyday requirements. We can leave him with confidence to pursue his own bright aerial flight. What we do want, however, is to effect a general raising of the standard of excellence among the earnest and thoughtful men who will in after-life have to carry on much of the world's work, and it is to help us in this object that we have appealed for assistance to all those who are interested in the progress of architecture.

We do not profess to be able to create artists; that is an achievement which it is not in the power of this or of any other Association to effect, for the artist, like the poet, is born, not made; but what we do profess to be able to do is to educate that artist when he has been created; to assist in developing the artistic instinct which may be within him, and to give him an opportunity of acquiring instruction, *pari passu* with his artistic development in those methods of practical construction and sanitation, without which his artistic attainments are of very little value. Surely this is a basis upon which all architects may unite to assist us.

That some such instruction is urgently required may be seen by any one who will take

the trouble to walk through the streets of this or any other large town and examine the buildings which have been erected in the past fifty years or so. I grant that there are a few brilliant exceptions, but these form but a small percentage in the vast aggregate of dull, monotonous, common-place buildings, plastered over with meaningless ornament and covered with unnecessary features, which force themselves upon us on every side. I believe that at the present time there are signs of an awakening, and a promise of better things to come; and it is for you to say if this promise is to be fulfilled. We have heard much of late years about styles, and the possibility of a new one being created, which is to become the style of the future; but what we want is "style," not "styles"; and it is not until we cease masquerading in the fancy dress of every other country and period but our own that any real progress will be made towards the attainment of this object.

What do we mean by "style"? "Style" in architecture I take to be the language by which we express our thoughts, and it should be the natural expression of the requirements of a building controlled by the exigencies of climates and the proper use of the materials at our command. Viollet-le-Duc, in one of his lectures, instances a modern locomotive engine as one of the best examples of "style," because its outward appearance is the simple outcome of the requirements of the interior without any attempt at concealment or unnecessary adornment, and is perfectly fitted for its work. When we can be satisfied with giving the same natural expression to the requirements and construction of our buildings, only using ornament where we feel it is required for a definite purpose, and thinking less of past styles and more of modern requirements, then, and not till then, shall we once more have a style of our own. The study of the styles of the past is a most interesting one, but it is archaeology, not architecture, and it is only valuable to us as architects if we can make use of it properly; to learn broad principles from the study of it, to see how our predecessors obtained the results we admire, and, in fact, to learn to do as they did and not to copy what they did. As long as we continue to reproduce the styles of the past in our work of to-day, and to palm them off upon a confiding public as our own creations, so long shall we delay the possibility of architecture once more becoming a living art amongst us. Let us study and reverence the work of the past, for there is much to be learned from it, but the highest and the best lesson of all is not to copy it.

Gentlemen, I have now endeavoured to give you, very imperfectly I fear, some account of our work in the past and our hopes for the future, and to direct your attention to some of the points which are of importance to us as architects and members of this Association. I feel conscious that there are many things left unsaid, for which I must crave your indulgence; but it is not easy to compress all that one might wish to say on the subject into the limits of an address such as this, and I fear I have already trespassed on your kindness too long. I am consoled, however, by the reflection that it is not by words but by deeds that the architect must stand or fall, that it is by what we do and not by what we say that we shall be judged hereafter. I would, therefore, in conclusion, urge you to think no trouble too great to achieve a satisfactory result in your work, and never to rest until you have made whatever is confided to your charge as perfect as possible for its purpose, and as beautiful as you can, no matter how small or simple the work may be. Everything is capable of being invested with some amount of individuality and interest if we will only take the trouble to think for ourselves, and not blindly follow the stereotyped forms laid down for us by others; and it is often the smallest things which require the most care and thought, and in which true artistic feeling is best displayed.

Do not for one moment suppose that on this account, or from anything I have said above, I would seek to curb or restrain the aspiring genius who dreams of doing great things; on the contrary, I would say, set your ideal as high as you possibly can, for it is given to few men to attain to the summit of their ambition, and the higher your aim the greater chance of your doing something; but I do wish to emphasize the fact that it is not in cathedrals or other buildings of great size and importance alone that scope is afforded for originality and

artistic feeling, but that everything which comes to your hand, no matter how small or insignificant, is capable of being made beautiful and suitable for its purpose, and such that it may give pleasure to those who have to use it. If you do this, you will have realised in the highest sense the meaning of our motto: "Design with beauty, build in truth."

Mr. Aston Webb said he wished to be allowed to propose a vote of thanks to the President for his address. It afforded him great pleasure to do so, for Mr. Cresswell was his first pupil, and he naturally felt some pride in seeing him occupy the Chair of the Association. He thought Mr. Cresswell's address had steered exactly the right course between two extremes. He had explained in some detail the working of the Association's new educational scheme, and he had touched lightly upon other subjects underlying which there was at present some smouldering fire; but he had touched them so lightly that there was no fear of controversial questions coming up on that occasion. During his (the speaker's) presidency, a good many years ago, the Association was a quiet, rather easy-going body,—a society entirely for mutual instruction. They used to have classes in which they criticised pretty freely each others' work, and incidentally made many friendships which they highly valued. Now things were quite changed: the Association had a journal; it had contested elections, and it had electioneering pamphlets. All that was evidence that the Association was alive, and no doubt it would be all the better, and none the worse, for the discussions which cropped up during the last session. In speaking of the scheme of education which had been started, one could not help thinking how much the scheme had been indebted to the energetic originator of it, Mr. Leonard Stokes, and it must be a great pleasure to him to see that the members were beginning to appreciate it and to use it more freely. With regard to the "third and fourth years" of the course, one would naturally expect that at first they would not be so fully attended as the others. In looking around the room that evening at the large number of drawings exhibited, one must feel that an immense deal had been done during the past year, though the drawings exhibited did not represent anything like the whole of the work that had been done, consisting as they mostly did of prize drawings only. He had been very pleased with the tone of the President's address; it contained no hard words against the Institute, nor anybody else. He had touched on the question of the Examinations lightly, and, of course, those examinations were very much in every one's mind at present. The President had said that it was not the duty of the Association to decide whether the Institute should have examinations or not; but just suppose if the Institute admitted members without any examination of their qualifications at all, what would he say then? He could imagine what an opportunity for the critics this would be. The Institute now, before admitting a member, was careful to ascertain if he was worthy of being admitted to its ranks. The Fellowship or the diploma should not be looked upon as a mere personal distinction. Architects should not join societies for such reasons, but for the sake of the good that societies were capable of rendering to architecture and the profession to which they belonged. Such societies were for the general good, not for the individual; a far higher diploma was open to all architects than from any society at all. One must go into the streets for that, for the diploma was obtained in bricks and mortar, Portland stone, and materials of that sort; and it was in the streets of our great towns and the churches all over the country that this could be won. It was for his executed buildings that an architect received from his *confrères* a far higher diploma than any society could possibly give him. The President had mentioned the great importance of visiting new buildings in progress, and had referred to the opportunities which the Association offered to its members for doing so. The President had been rather severe upon modern buildings, no doubt correctly; but he (the speaker) was not quite sure whether that was the best way to regard them. It was extremely easy when one saw a modern building to say, "Well, I don't think much of that;" but he had noticed very often that those who did the best work, when they saw a modern building by

another architect were more desirous to find out what he had been aiming at, and how far he had succeeded in his aim than to detect its faults. The merest tyro in the Association when he was going over a new building, could easily see its defects; but while it was sometimes far more difficult to find out the good points of a new building, it was certainly far more pleasurable, and he would recommend the members of the Association on seeing a new building to try and ascertain the object of the designer, and to see how far he had attained his object, before criticising the work. Of course, it was impossible not to see defects in most buildings, but they should learn to seek and dwell upon their good points rather than their defects. In conclusion, he expressed his personal gratification in seeing Mr. Cresswell in the Presidential chair, the highest honour which the Association could confer upon any of its members, and he begged to move a very hearty vote of thanks to him for the admirable address which he had delivered.

Mr. Cole A. Adams said he had much pleasure in seconding the vote of thanks which had been so eloquently proposed by Mr. Aston Webb, to whom it must be a great satisfaction to see his former pupil occupying the distinguished position of President of the Association. The President, as had been said by Mr. Aston Webb, had touched lightly upon various matters which in the past had been burning questions in the Association, and he (the speaker) desired to express his thorough appreciation of the conciliatory line which the President had taken. He trusted that they would now all throw their energies into working for the well-being of the Association. When reviewing the work of the past session, it was impossible not to have in mind the services of those who had been the chief movers in the promulgation of the new educational scheme of the Association. Foremost amongst them was Mr. Leonard Stokes, and he (the speaker) had great pleasure in testifying to the great tact, energy, and skill which he had shown in relation to that matter, proving in this, as well as by his works as an architect, that he was a man distinguished by ability and talent. The President had alluded to the importance of the study of works in progress; he thoroughly endorsed that opinion, and trusted that it would soon become more common that it would soon for principals to allow their pupils to visit works in progress frequently, for a little experience gained upon an actual building was worth more than a great deal of experience in drawing and tracing in the office. In connexion with that matter, he might call attention to a very practical suggestion made by Professor Roger Smith in one of his lectures. That suggestion was to the effect that a walk through the streets of London was full of teaching in building matters. Probably everyone who had half an hour's walk daily between home and office would be able to watch day-by-day the progress of some new building or other, and in many instances he would no doubt readily gain permission from the architect to visit the building occasionally, and would be able to get valuable information from the foreman or clerk of works. He heartily concurred with the President as to the importance of measuring old buildings. The President had very rightly and very properly alluded to the question of the charge which had been brought against the Association that it was a "cramming" institution, and he trusted that once and for ever a nail had been driven into that coffin. It was a most unjust charge to make, for the Association had its lectures and classes, and the man who made the best use of them would have no need whatever to "cram," if he took them in their proper course. He knew it might be said that wherever examinations were instituted there would be a tendency to "cram," but the knowledge gained by "cramming" was merely superficial, and was not to be compared with that which was to be gained by a systematic course of instruction such as was afforded by the classes of the Association. He thanked the President very warmly for his address, and heartily seconded the vote of thanks to him.

Professor Kerr said he had much pleasure in supporting the vote of thanks to the President, and he did so with all sincerity and fervour. It was one of the greatest pleasures of his life to come down occasionally to the meetings of the Association, and especially to the opening meetings of the session. He had attended a

good many of those meetings, and had seen the chair occupied by a succession of young men who had become distinguished in the profession. The Association was the most successful society that he knew of,—absolutely the most successful. Let them consider for a moment. Nearly fifty years ago the Association was founded by a very few very young men for the purpose of engaging in fortnightly discussions upon the manner of their seniors in the Institute, with the object in view of improving themselves educationally, in recognition of the fact that ordinary office training was not equal to that end. Let them consider what had been done by the Association since that time; let them look at its position at the present time. Not only did they have disputed elections, which were of importance to the profession at large; not only did they have warm discussions upon points of controversy,—and such discussions were the life-blood of a society; not only had they held Classes with a directly educational purpose for so many years; not only did they maintain the A.A. "Sketchbook," which was one of the most meritorious productions of the profession; not only did they carry on their journal, *A.A. Notes*, which seemed to be equally well conducted whether by one party or another; not only did they do all these things, but they had now established what was practically an Architectural University, and they were able to dismiss with a mere wave of the hand, as a thing never to be mentioned again, the supposition that the Association was a mere cramming institution. In no sense whatever was cramming involved in the educational programme of the Association. Those who used the word "cramming" as a term of reproach applied to the Classes of the Association must forget what cramming meant. It did not mean anything approaching what was done in those Classes; what was done there was entirely the reverse of cramming; it was education by means of systematic courses of instruction, and not cramming to pass an examination by mere artifice. Having had something to do with the educational scheme of the Association last year, he was bound to say that he had now a much higher opinion of it than he had at the commencement of the year. He thought then that it might perhaps be partially successful; he now thought that it would be perfectly successful. The Classes were well arranged, and the work that had been done in them, although not conspicuous, was no doubt on that account all the more solid and substantial. The young architect taking up at the present time the programme of the educational scheme of the Association, had it in his power to acquire all that could be learnt in classes or studio. He did not know any other course of study which could be pursued by him in London or out of London, with more benefit. He would give to see that the two Colleges of London were making great efforts in the direction of architectural education; but there was one point in which the Association had a great advantage over them, and, without disparaging in any degree whatever the means of education at the great colleges, the great advantage which the Association possessed was that it had a number of lecturers, all of whom were architects, and who collectively would be able to teach the whole philosophy of architecture. He was very pleased to hear that, financially, the scheme had not been ruinous to the Association, as he was almost afraid that it might be, and there seemed to be reason for hoping that it would be successful even in this respect. He had heard it suggested that the management of the scheme ought to be in the hands of older men; but he did not think so, for the older men were too busily occupied to give time and attention to the undertaking; on the contrary, the men whom they had on the Committee of the Association were precisely at the proper age for carrying it out successfully. He thought that if it were proposed (as it would not be) that the Institute should join in the management of the Association's Classes, it would not be for their advantage, and he believed that those who had the keeping of the affairs of the Institute would be of the same opinion. He therefore thought they might proceed with all energy, and with every hope of success. He said this sincerely and earnestly, for what it was worth; and having been connected with educational matters for so many years he might be considered entitled to give them a word of God-speed. As regarded the great question which seemed to have stirred up

a little storm amongst them (he supposed it was the question whether architecture was an art or a profession, for he did not know of any other question that was agitating the architectural mind at the present moment), he was very happy to hear from the President's address, and from the applause with which it was greeted, that the Association was in favour of peace and mutual forbearance. They could not all be great artists. He (the speaker) was not a great artist himself; he never pretended to be one, but he professed to be an architect, and had been an architect all his life. He was made an architect by accident, as they all were; even some of the most distinguished men in the profession had entered it by accident. If any of them thought themselves to be more of artists than of architects, he would advise them not to be too proud of their artistic aspirations. An artist would be always soaring up into the empyrean; he could not help it. Let him do so to his heart's content; it would do him good, and when he descended to the level of the earth he would be none the worse for having given vent to his superfluous energy. He hoped that there would be no acrimonious discussions upon such questions within the ranks of the Association. Anything like a split in the Association on such a point would be simply ridiculous. If there must be a split on such a question, let it occur in another place, where men were able to look after themselves and to take care of each other. The Association could afford to do no such thing. He had very great pleasure in cordially supporting the vote of thanks to the President.

Mr. Thomas Blashill, Superintendent Architect to the London County Council, said it was exactly thirty years since he had the great honour and privilege of occupying the Presidential chair of the Association for the first time. He cordially supported the vote of thanks to the new President. Something had been said of some little disputes which had taken place in the Association of late, but those disputes were insignificant compared with the disputes which they had in his early days. As was the case then, he believed that at the present time the Association would be all the better for a little awakening. He did not think that there was one point in the President's address in which he did not more or less cordially concur, and if anyone had desired to get disputable matter out of it it would have been very difficult indeed. The advice given in it was thoroughly sound. He should like, however, to refer to one point relating to the present working of the Association. He was looking through the new "Brown Book" the other day, and was searching for the Class of Design; but to his horror and astonishment he could not find it. He spoke to two or three friends about it, and learnt that the Class no longer exists in name, though it exists under other names and in fragments, such as the Discussion Section, and other sections. He could not help feeling a little regret at the disappearance of the Class; for to his mind the existence of a class of design, in which men were endeavouring to strike out something for themselves, would facilitate more than anything else he could think of the formation of correct ideas, especially when their efforts were criticised by their fellows and neighbours. The Class of Design used to be the backbone of the Association, and he regretted to see that it had vanished, if only in name; not that he wished to set his opinion against that of those who had the practical carrying out of the educational scheme of the Association. In conclusion, Mr. Blashill referred to the advantages which the younger members of the Association might derive from a visit to Rome, and intimated that if anything of the kind were contemplated during the ensuing session, he would gladly co-operate with the Association to bring it about.

Mr. Leonard Stokes wished to be allowed cordially to support the vote of thanks to the President, and he trusted that after the very peaceful and gratifying words which had been uttered that evening all the members of the Association would work in the same spirit of unity that had characterised their efforts previously to a few months ago. He put the vote of thanks to the meeting, which was carried by acclamation.

The President, in reply, thanked the members for that mark of their appreciation, and said that he cordially agreed with what had been said by Mr. Cole Adams and Mr. Aston Webb as to Mr. Stokes's services to the Association.

With regard to the disappearance of the Class of Design, to which Mr. Blashill had referred, the explanation was that the whole Studio now, in fact, represented the Class of Design, very much enlarged and, as they hoped, improved. Instead of having a class of design only meeting at rare intervals, it was now constantly meeting in the Studio under the direction of two Instructors and many Visitors, so that, although the Class of Design no longer existed in name, they had by no means done away with instruction in design; on the contrary, they had greatly increased the means of instruction in that subject. With regard to the proposed Italian excursion, the matter should have careful consideration.

The meeting then terminated.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon last, at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

The Proposed Street from Holborn to the Strand.—The Parliamentary Committee brought up a long report on the subject of the proposed new street from Holborn to the Strand. As will be known by our readers, we have already given at great length the details of this proposed improvement.* It is only necessary now to mention here that the Council on July 23 last decided to seek Parliamentary powers to carry out the improvement (subject to what is known as the "betterment" clause), and referred it to the Improvements and Parliamentary Committee to "consider and report jointly whether the limits of deviation on the deposited plans should be sufficiently wide to enable the Council to purchase the property comprised in the larger schedule, and also that between Wych-street and Holywell-street, and whether there would be advantage in the Council seeking power from Parliament to enable the Council to purchase the freehold interest only in such property, and having purchased the same to allow the leases affecting the same to run out, and also whether powers should not be taken in the Bill to proceed with the widening of Surrey-street and Southampton-row." It was also resolved on that occasion "That it be referred to the Public Health and Housing Committee to consider and report on the best mode of re-housing the persons of the labouring class who would be displaced by the construction of the new street and its approaches." The Parliamentary Committee reported that they had also considered the following resolution, passed by the Council on July 26, viz.—"That it is advisable to rehouse the persons who will be displaced by the carrying out of the scheme of the new street from Holborn to the Strand, on the lines indicated in the report of the Public Health and Housing Committee, dated July 11, 1892, and that it be referred to the Parliamentary Committee to report if the same can practically be provided by the private Bill relating to the formation of the street, or by any and what other proceeding." The Parliamentary Committee now reported (and the Improvements Committee endorsed and approved the report), recommending, among other things, the extension of the scheme to the north by the widening of Southampton-row, and to the south by the widening of Wych-street, but disapproving the widening of Surrey-street, Strand. The Committee also recommended

"(1) That powers be sought in the Bill for the compulsory acquisition of the sites in the districts of Holborn and Clerkenwell referred to in this report, for the purpose of rehousing those of the labouring classes displaced who from their occupations or other considerations ought to be accommodated within a mile of the new street, and that it be referred to the Public Health and Housing Committee to negotiate and enter into conditional agreements, subject to confirmation by Parliament, for purchase of any of the sites in question.

"(2) That provisions be inserted in the Bill to enable the Council to re-house the remainder of the displaced working population in other districts of London, or in a suburb to be selected by the Council, and to provide for such persons as may be removed to a suburb, free transit by train or tram, as mentioned in this report."

The recommendations of the Committee were agreed to after a long discussion. Most of the proposals were agreed to substantially unaltered, but recommendation *g* elicited a long

* See *Builder* for July 9 last for plan and full description of the street as then proposed, and *Builder* for July 30, p. 340, for report of the discussion of the project by the Council.

discussion, in the course of which the proposal to provide free transit was strongly condemned, as likely to prove utterly unworkable and open to many abuses. Eventually recommendation *g* was carried by the narrow majority of 50 to 46, with the addition, at the end of the paragraph, of the words, "or to provide such other compensation as may be practicable in each case."

Proposed Amendments of the Metropolitan Building Acts.—The Parliamentary Committee reported as follows on this subject:—

"On July 26 last the Council instructed us to recommend to H.M. Government at an early date after the recess to introduce in the next session of Parliament Bills to consolidate and amend the Acts regulating the erection of buildings and laying out of streets in London. We have accordingly prepared and forwarded to the Local Government Board a letter conveying the wishes of the Council. The Council had previously, on July 12, referred it to us to take such steps as we might be advised to secure the passing of a general Act of Parliament, or the insertion of clauses in all future School Board Provisional Order Acts, providing that any buildings to be erected by that Board shall be subject to the general law. This appeared to us to be a matter which might properly be included in our communication to the Local Government Board, and we have accordingly forwarded a statement of the facts which gave rise to the Council's resolution, and have suggested that provision should be made to meet the case either in the Bill for the amendment of the Building Act or in future School Board Provisional Order Acts."

After transacting other business, the Council adjourned at half-past seven.

Illustrations.

ILLUSTRATIONS OF OLD CHESTER.*

VII.—STANLEY PALACE.

SUBJECTS accessible to the photographer have not been included in this series, but illustrations of Watergate-street would be incomplete without a view of that fine old residence, Stanley Palace, which stands in a narrow court, and is almost hidden by the houses on the south side of the street. The very narrow approach might easily be passed many times, even by visitors in search of the oldest really good specimen of timber architecture in Chester.

Stanley Palace was purchased by the Archaeological Society of Chester, after the interior had been ruined by the removal of chimney-pieces and objects of interest; fortunately the front shown in the illustration was preserved to Chester, though at one time it was in danger of being transported to America.

The mansion was the City residence of the Stanleys of Alderley, a noted county family, and now ennobled; it is historically interesting as being the place where the unfortunate Earl of Derby spent his last day before he was taken to be executed at Bolton, in 1657.

The portion of the palace remaining shows three gables towards the court, and these are beautifully designed and extremely well carved and ornamented. It was erected in 1591. The dignity of the exterior pervaded the internal construction; the rooms are large, and the panelling, fittings, and floors were of oak.

Having escaped destruction a few years ago, it is fortunate that once more it has become the property of the Earl of Derby, who purchased it recently from the Archaeological Society.

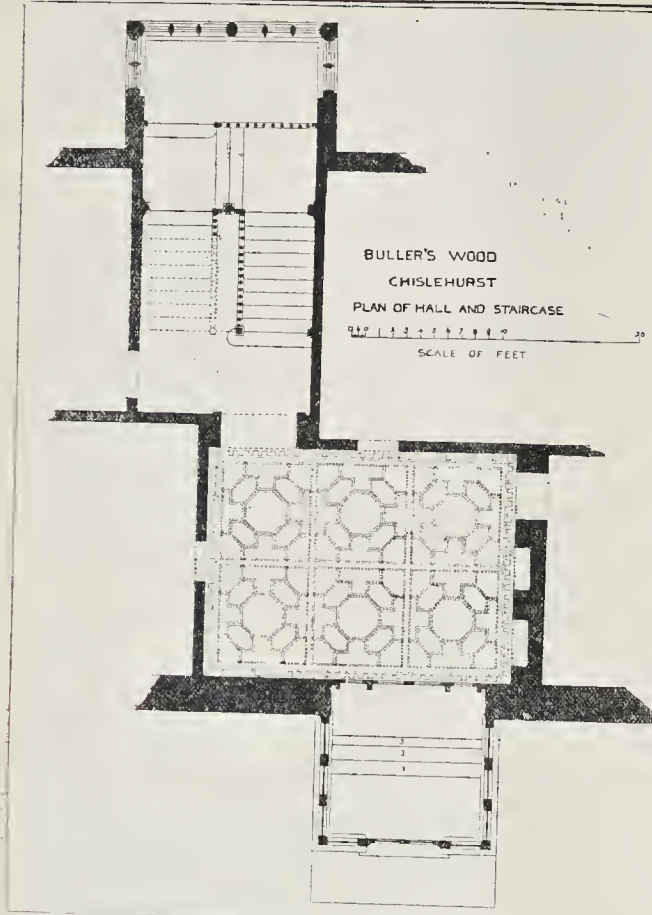
The range of brick houses opposite stands where a row formerly existed.

THOMAS P. IVISON.

COMPETITION DESIGN FOR BIRMINGHAM HOSPITAL.

THE illustration represents a portion of Mr. W. H. Bidlake's design for the new Birmingham General Hospital, submitted in competition last February. The conditions required accommodation for 304 beds for the sum of 80,000*l.*, including permanent fixtures, heating and ventilation. No margin was therefore allowed for elaboration, even if such were desirable in this design were red brick walls, with warm buff terra-cotta dressings, and green slate roofs; and the central

* For preceding views of this series, see *Builder* for February 6, February 27, March 12, April 9, May 23, and July 30 last.



porch, with the bay-window and balcony over, were to be entirely of terra-cotta, with a copper ogee roof. The portion represented in the drawing is the administration block.
The drawing was exhibited at the Royal Academy exhibition of this year.

HALL AND STAIRCASE, BULLER'S WOOD, CHISLEHURST.

"BULLER'S WOOD" is a modern house remodelled inside and out. A room and a passage go to make the present hall, of which the interior is here illustrated. The old staircase was in the same place as the new, but the space was lengthened and the bay-window added (see plan).

The hall is panelled and has an oak floor and a pattern plaster ceiling: the staircase has dwarf panelling. All the woodwork is of deal painted in stone colour. The woodwork was made locally by Messrs. Arnaud & Son of Bromley; the plaster ceiling was specially made by Messrs. Jackson.

The architect is Mr. Ernest Newton, and the drawings from which the illustrations are taken were exhibited at the Royal Academy this year.

WINDOWS FOR THE IMPERIAL INSTITUTE.

THESE windows were designed by Mr. Clement Heaton, with the view of producing stained-glass designs harmonising with the general style of the building, and having reference to the special objects of the Imperial Institute as representative of the union between England and her colonies. The colonies illustrated in these two windows are Australia and South Africa, represented by figures and animals characteristic of each country. We should have liked to see these centre trophies de-

signed with a little more connexion with the border, instead of appearing to be placed in the middle of a white space; but in general the design of the windows is both effective and suitable for their purpose and surroundings.
The original drawings were exhibited at the Royal Academy of this year.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

WE give this week the substance of the evidence of Mr. Baldwin Latham and Mr. Peregrine Birch as to the sufficiency of our present sources of supply if they are utilised. Mr. Latham, it will be seen, dealt with the resources and possible requirements of the whole area from which the supplies are or may be drawn.

Mr. Baldwin Latham, C.E., gave evidence in support of a memorandum he had prepared, in which he arrived at the conclusion that in the river Thames, the Lea, and the upper waters of the Ouse, and in the chalk formation around London, there is abundance of good and wholesome water that will practically serve London and its neighbourhood for a century to come.

Suggested Connexion between the Thames and Lea Basins.

Referring to the calculations that have been made of the areas of the two valleys, Mr. Latham says:—

"A proper hydrogeological survey of these rivers has, as far as I know, never been made. Two partial surveys of the area between the River Thames and the Lea, made by me in the years 1882 and 1884, showed it was extremely difficult to draw a line between the watersheds

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 455, 480, 503; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 298, 318.

of the Thames and the Lea, and in all probability a portion of the water of the Thames basin proper flows underground and furnishes the supply of water to the wells in the lower portion of the Lea Valley, and also to some of the wells under London. Judging from my past experience, it would take a longer time than is now available to complete these underground water surveys, but as to the fact that there is a transference of water from the Thames basin underground in the direction of the lower part of the same basin, there can be no reasonable doubt. There is also a direct communication between the Colne, one of the tributaries of the Thames, above the water companies' intakes, and the tidal portion of the Thames, and a direct transference of water from the upper, or non-tidal, into the lower tidal reaches. It has also been suggested that there is an underground communication between the upper Thames and the tidal portion of the river, and that large volumes of water are discharged into the river between Teddington and Kew, as shown by a recent communication by the late Mr. John Thornhill Harrison, Mem.Inst.C.E., to the Institution of Civil Engineers, and the views contained in this communication are partially supported by such a distinguished geologist as Professor Prestwich, and are, therefore, deserving of serious consideration."

He adhered to the areas which had been submitted to and accepted by former Commissions: Thames above Teddington 3,676 square miles; total to mouth, 5,162. The minimum dry weather flow at Teddington had been given at 12 cubic feet per square mile per minute; but it was brought down to 10 by gaugings in September, 1865. The Lea area is 444 square miles, about 50 being intercepted by a cut made by the East London Company to bring foul waters below the intakes. Gaugings at Field's Weir, plus the supply of the New River Company, give 13.4 cubic feet per square mile per minute, reduced to 10 in August, 1864, and September, 1865. In the inquiry before the Royal Commission in 1868, the areas of permeable and impermeable strata above Teddington Weir were given as follows:—

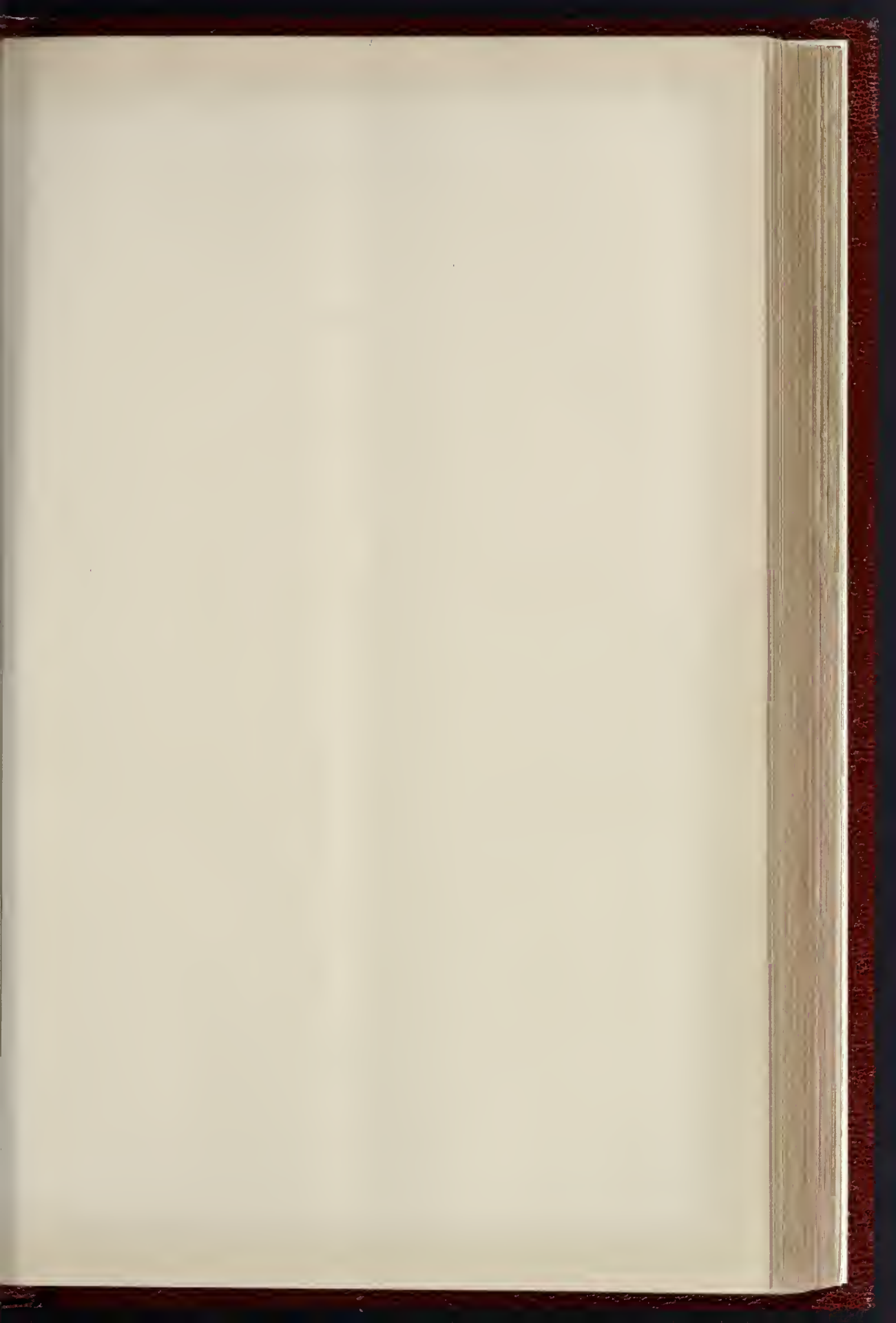
Impermeable	1,233.5 miles.
Shallow permeable	730.5 "
Deep permeable	1,712.0 "
Total	3,676 square miles.

From the impermeable area nothing might flow off in an excessively dry time. The shallow permeable, such as the oolitic strata, from gaugings made by himself in the dry year of 1884, will yield at least 7 cubic feet per square mile per minute which could be depended upon, and the deeper permeable area of the chalk would yield at least 16 cubic feet per minute per square mile, or the absolute minimum flow would never fall below—

730.5 miles x 7 =	5,113.5 cubic ft. per minute.
1,712.0 " x 16 =	27,392.0 "
Total	32,505.5 "

Or 292,549,500 gallons per day, or but 8.8 cubic feet per mile per minute from the whole; and it must be a very exceptionally dry year which would give such a small yield as this. In his judgment no such year had occurred for many years past, and if a smaller quantity had been found at Teddington in any recent year, it was clear evidence that the water either flowed away by subterranean ducts or that there had been an error in gauging. Recent gaugings had shown the flow of the Thames, including all abstractions, to be 8.3 cubic feet per mile per minute, and that of the Lea to be 13.4. Inferentially,—

"From this figure it is quite clear that there is either an error in the gaugings of the Thames or the Lea, or there has been a direct transference of a large volume of water from the Thames area into the Lea or some other area, because, having regard to the very much smaller rainfall which falls upon the Lea area, it is obvious that the Lea, mile per mile, could never yield more than the Thames, and all previous gaugings of the Thames and Lea show this has been the case. Although the store of water in the Thames area was considerably less after this particular gauging, yet the actual gaugings of the Thames were shown to increase after the date of this gauging. Gaugings made at High or Chipping Wroome of the River Wye or Wick within the Thames watershed gave over 20 cubic feet per mile per minute. The Wandle at Croydon gave over 50 cubic feet per mile per minute. The gaugings of Wend-



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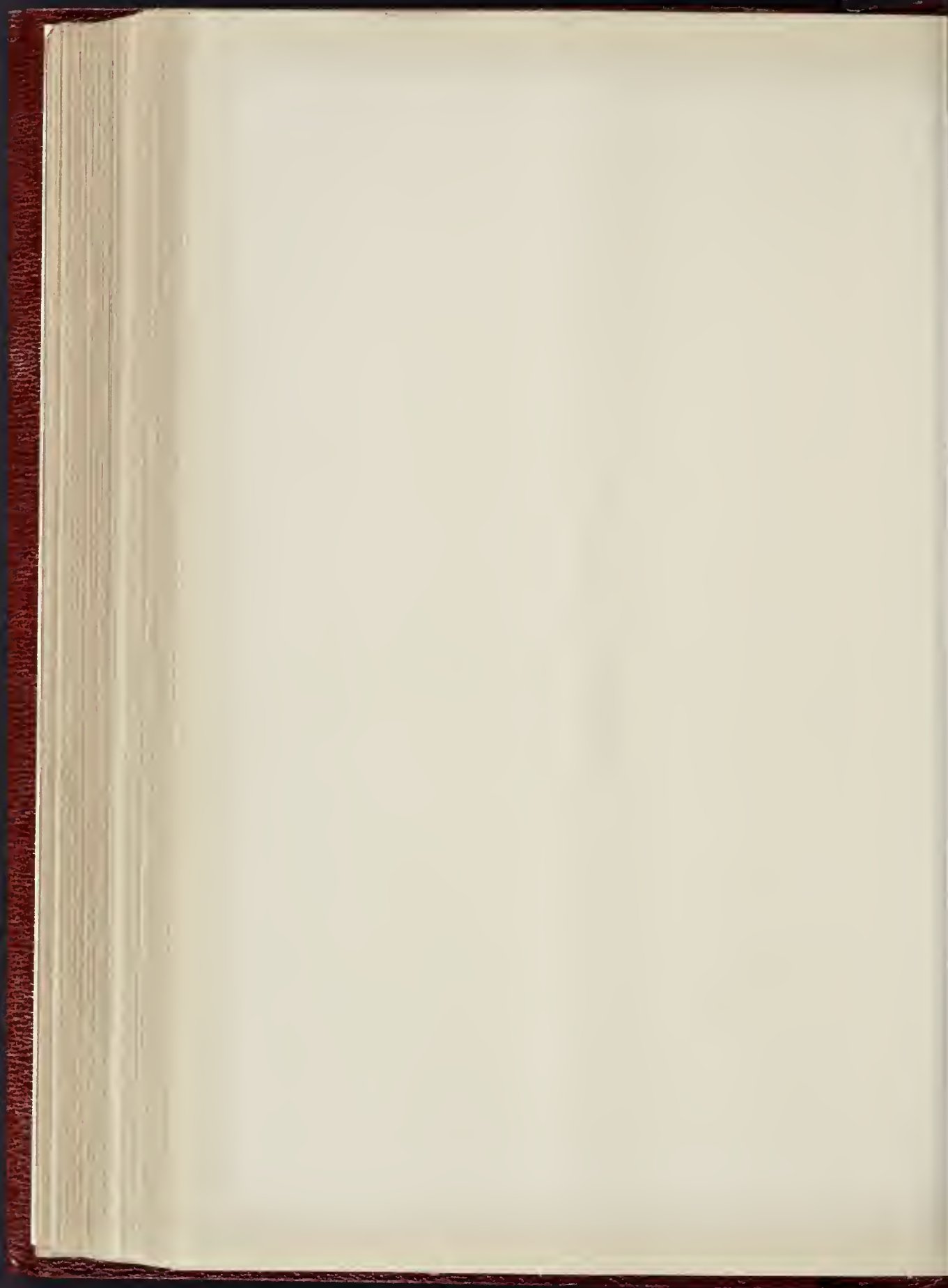




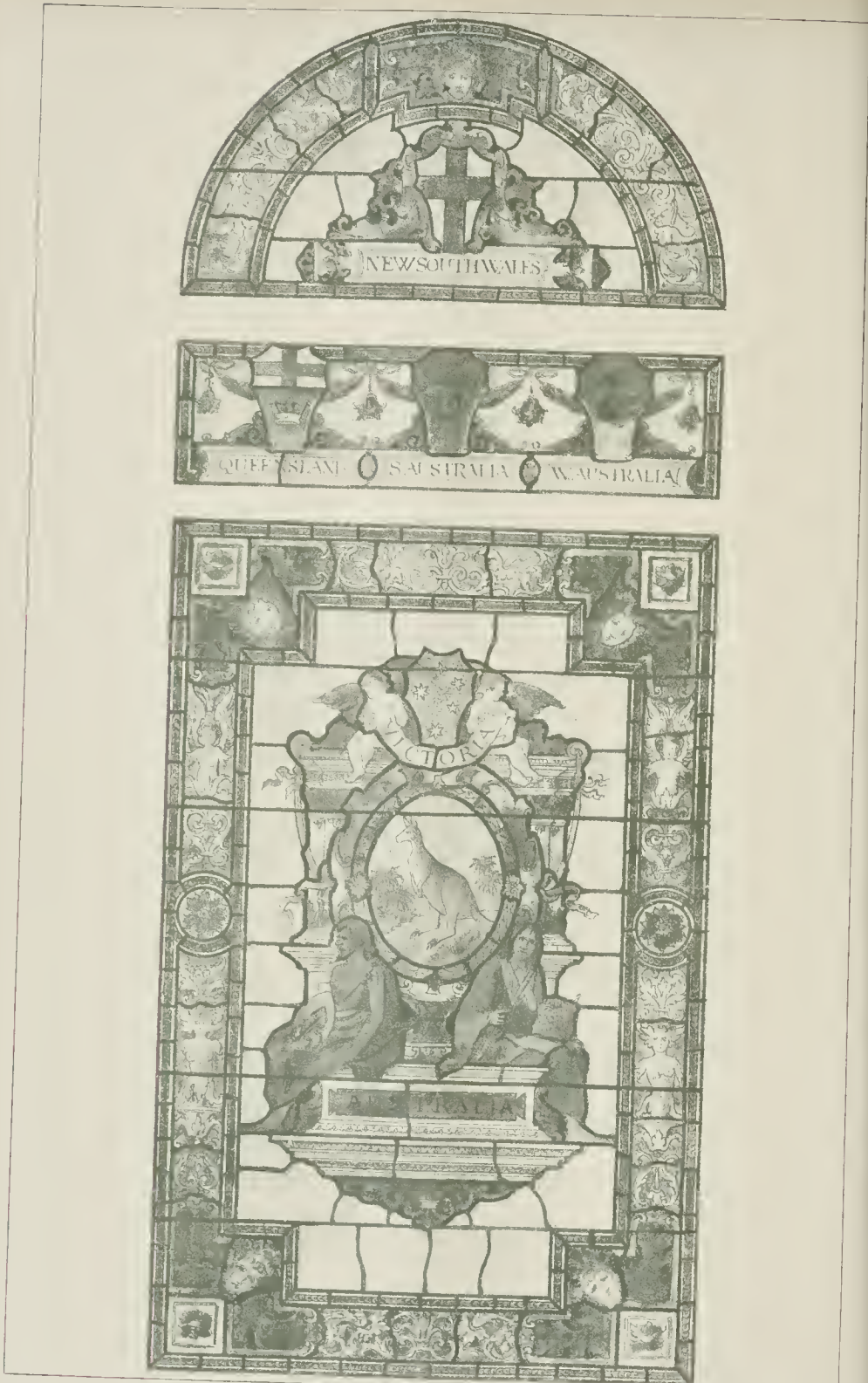
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COMPETITION DESIGN FOR THE BIRMINGHAM GENERAL HOSPITAL.—CORNER OF THE ADMINISTRATIVE BLOCK
BY MR. W. H. BIDLAKE, A.R.I.B.A.

Royal Academy Exhibition, 1892







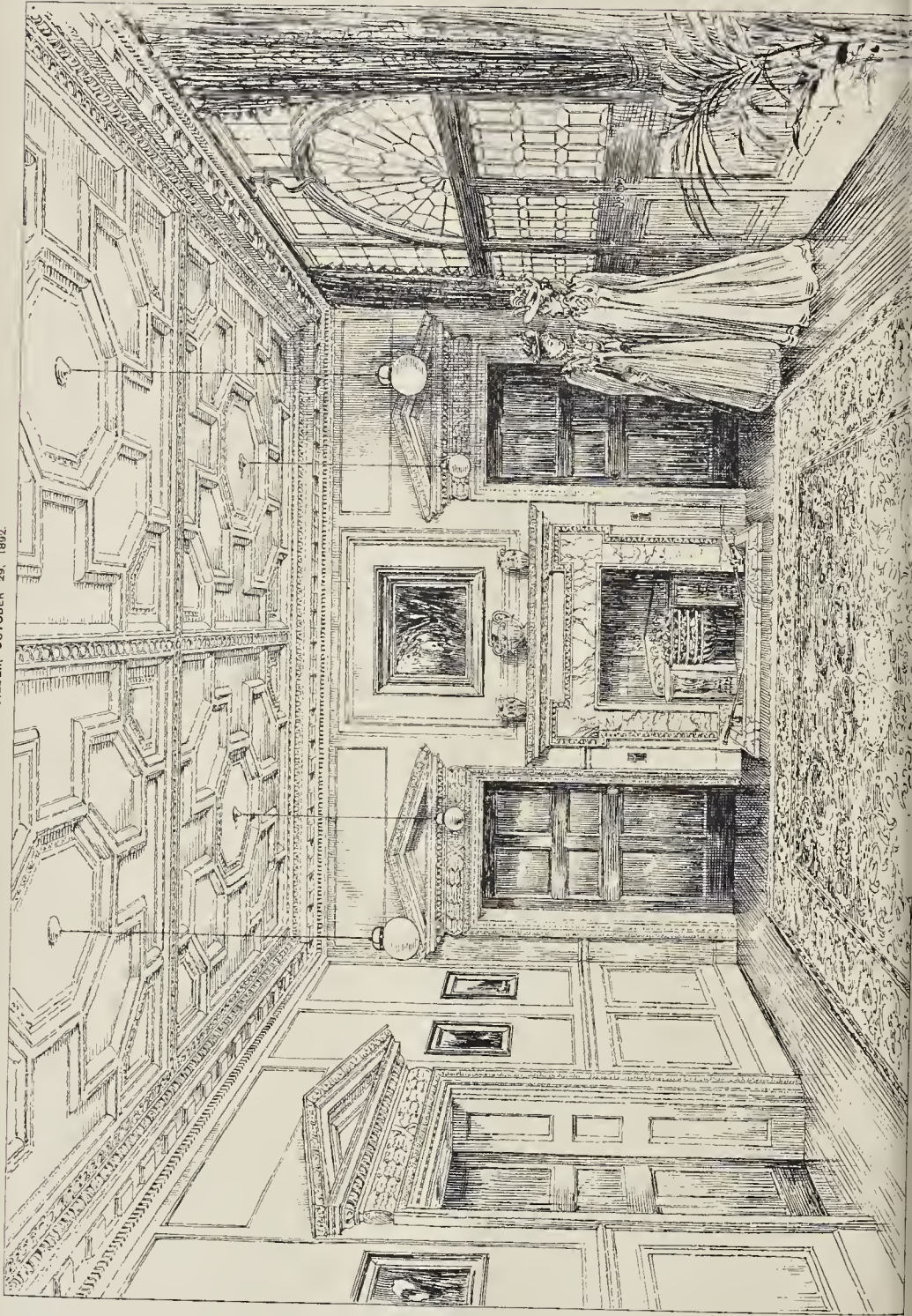
INA-PHOTO SPRADUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE, E.C.

ONE OF A SERIES OF WINDOWS FOR THE IMPERIAL INSTITUTE.—DESIGNED BY MR CLEMENT HEATON.

Royal Academy Exhibition, 1892



THE BUILDER, OCTOBER 29, 1892.



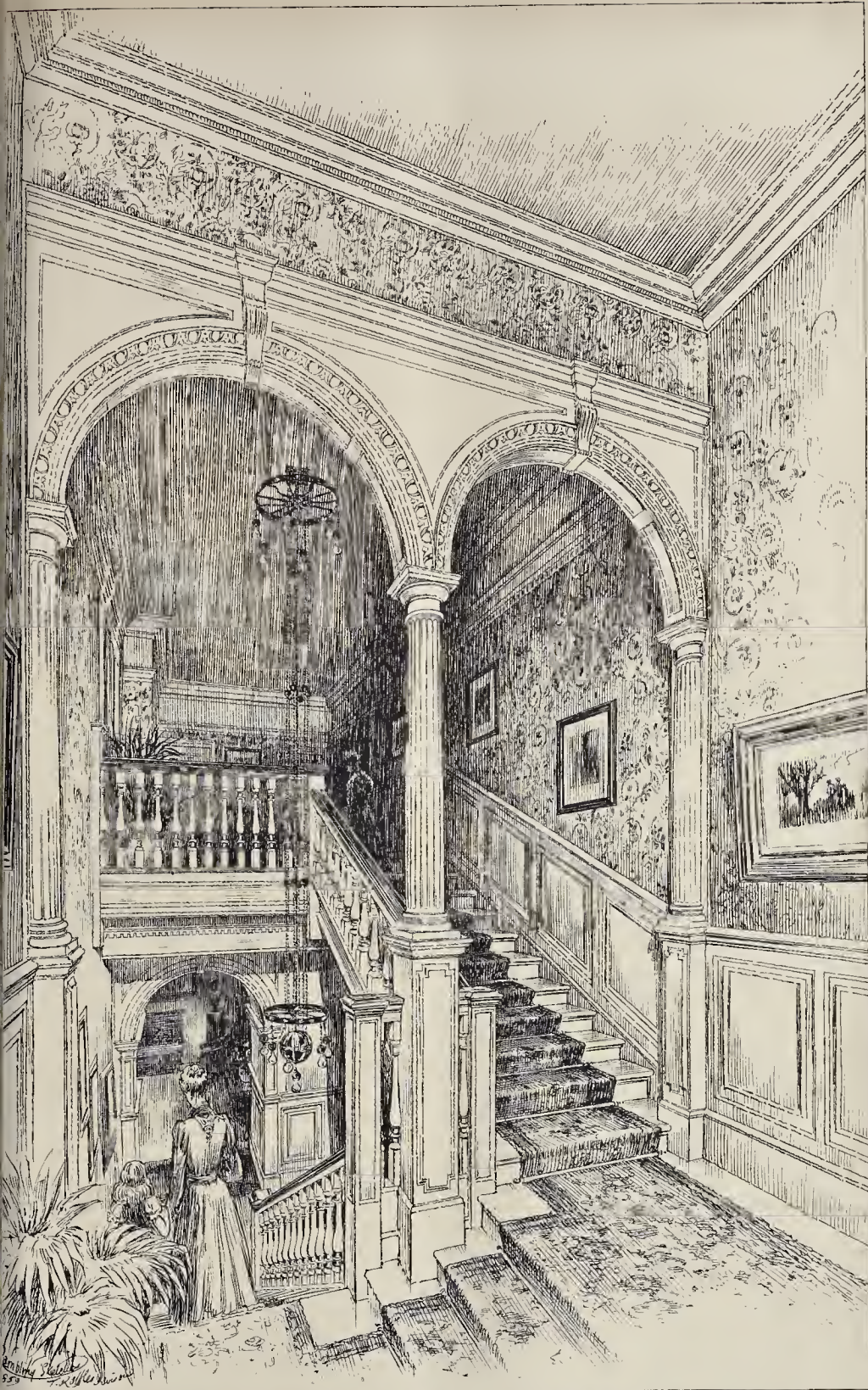
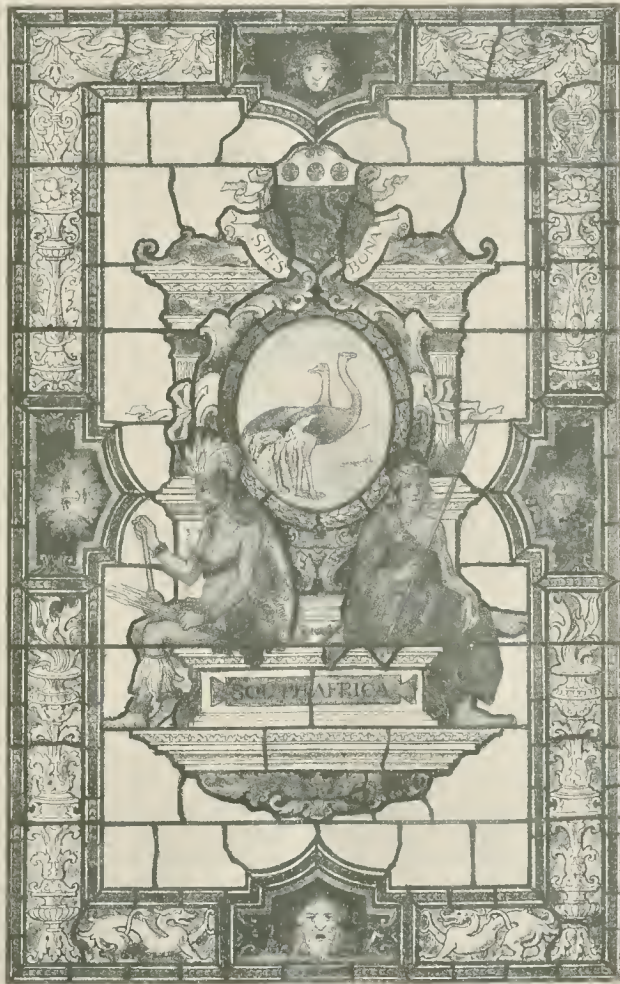


PHOTO-LITHO SPRAGUE & CO 48, EAST-HARDING STREET, FETTER LANE, E.C.

STAIRCASE, BULLER'S WOOD, CHISLEHURST.—MR. ERNEST NEWTON, ARCHITECT

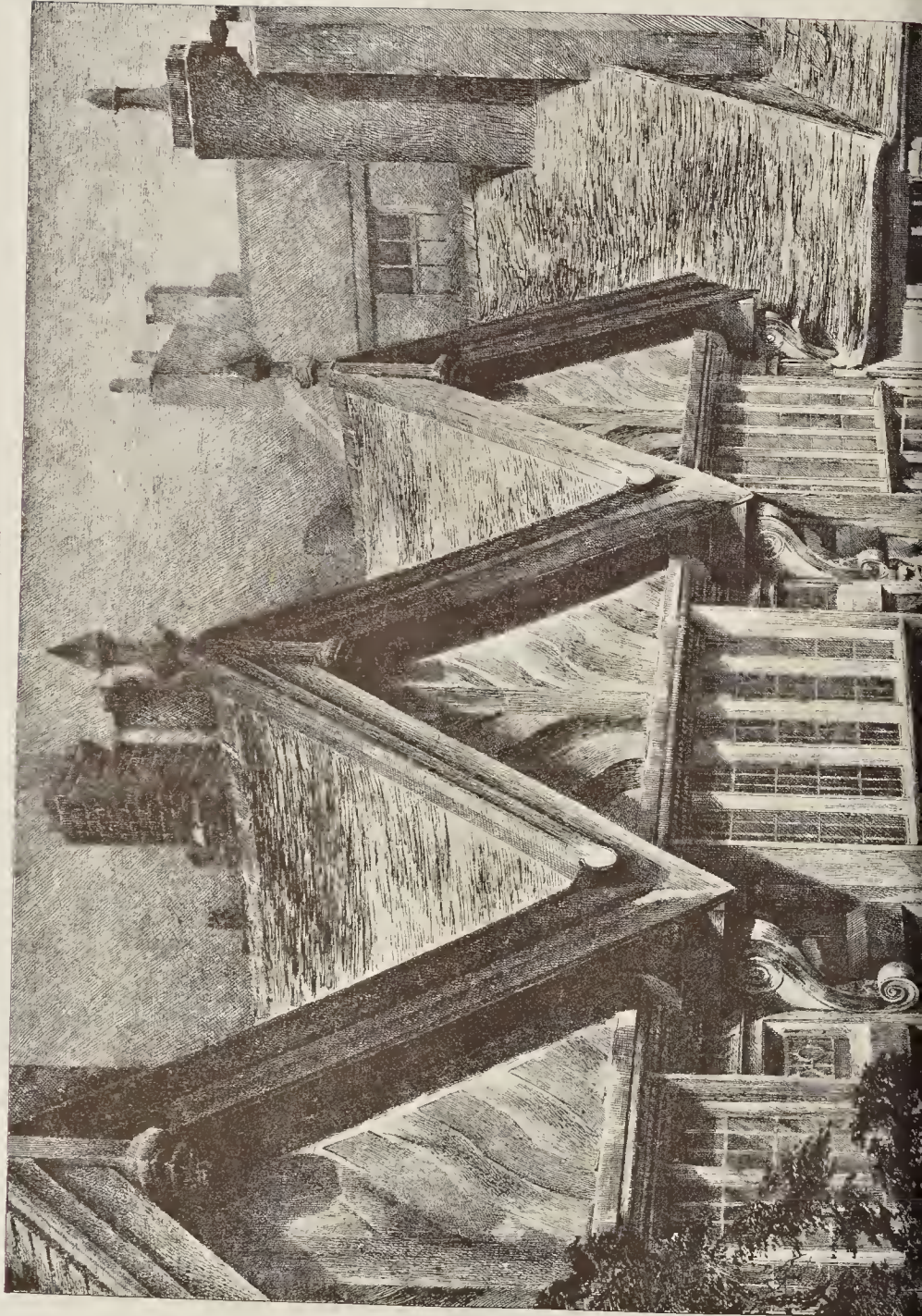


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ONE OF A SERIES OF WINDOWS FOR THE IMPERIAL INSTITUTE.—DESIGNED BY MR. CLEMENT HEATON.



THE BUILDER, OCTOBER 29, 1892.





NO. 7, OF BOWNE'S "A. & C. ST. MARKING STREET, CHESTER, JAN. 1871."

ILLUSTRATIONS OF OLD CHESTER.—DRAWN BY MR. T. P. IVISON
No. VII.—STANLEY PALACE, WATERGATE STREET.

... Springs, within the Thames watershed, by Mr. Herbert Thomas, Mem. Inst. C.E. in August, 1887, show no difference in their yield to that for this low gauging at Teddington. The late Mr. Beardmore gave evidence of stage gaugings—for the Thames 3484, for the Lea 2733; of minimum gaugings in four months in 1864—for the Thames 1166, the Lea 1126. On the abstractions from the upper portions of the Thames Mr. Baldwin thus says:

There is a direct transference of water from above the intakes of the water companies to points below the intakes. There are two rivers flowing out of the River Colne; the smaller of the two is called the Queen's or the Cardinal River, and it conveys water which provides the power both to work the water-wheels at Hampton Court Waterworks and to furnish a supply of water for domestic and other purposes, and afterwards passes into the Thames above Teddington, but below the intakes of the water companies. The second river, of a much more important character, is called the Duke of Northumberland's River, and it takes a quantity of water, probably not more than the average than 15,000,000 gallons a day, which it conveys to the Bedford Powder Mills, where it is used for the purposes of power, and afterwards escapes into the River Colne, working several mills in its course, and eventually discharging into the tidal portion of the Thames at Isleworth, below Teddington Lock. These two rivers in low-water periods transfer on an average about 20,000,000 gallons a day from above to below the intakes of the water companies.

There are also seven canals, of which six are being derelict) are supplied with water within the Thames area and discharge it outside that area. These canals are:—Wey and North Canal (derelict); Kennet and Avon Canal; Wilts and Berks Canal; Thames and Great Oxford Canal; Grand Junction Canal; and Paddington and Regent's Canal. These canals abstract water from the Thames area probably at a maximum of not more than about 10,000,000 gallons per day. The gaugings at Teddington, of course, include the quantities of water available above that point after allowing for all the abstractions to which I have drawn attention.

Below the intakes of the water companies above Teddington in the case of the Thames, there are three rivers which convey a considerable quantity of water into the Thames, namely, the Hogg's Mill, the Queen's or Cardinal River, and the River Mole. Either one of these rivers would be sufficient to supply all the water required for lockage below the intakes of the water companies.

Owing to the capacity of the tidal stream below the Teddington Lock, a transference of much water from a point of intake above Teddington Lock to the point at which it is discharged into the tidal river at Barking and Eppingness considerably accelerates the flow of its water out of the Thames, for it is transferred that distance in probably less than a day, whereas if it passed through the tidal channel itself it would be several days in passing to the same spot."

Available River and Well Supplies.

Without exhausting the rivers, the following quantities of water might, in the opinion of the witness, be depended upon:—

	Gallons per Day.
Water Leas when fully supplied with storage reservoirs, exclusive of water passing underground	70,000,000
Underground flow taking place in the dry years, 1854, 1855, exclusive of any water flowing from the Colne Valley, and partly supplying Tottenham, Reifield, Chessant, and the East London Water Company and some New River Wells	30,000,000
Epsom and neighbourhood within area of Hogg's Mill River, now supplying Epsom	3,000,000
Leas of Rivers Wandale and Ravensbourne, at present supplying water for East Surrey, Sutton, and Croydon Waterworks	10,000,000
River Mole Drainage area, present waterworks, Dorking, Reigate, Leatherhead	10,000,000
Chalk area east and south-east of London, Epsom, &c., supplies Kent Company	30,000,000
Essex area, now supplies South Essex	3,000,000
Existing works, Colne Valley	10,000,000
Leas of Northumberland's River, on compensation by pumping tidal water being given	15,000,000
Present provision for taking water from Thames	130,000,000
Total	311,000,000

This table does not take into consideration the utilisation of any of the flood waters of the Thames. The 311,000,000 gallons of water per day set out as being available are equal to 20 cubic feet per minute from 1,727½ miles. It is also equal to 4½ in. in depth off this area, which is but one-third of the entire area of the Thames watershed. These figures show that a very much larger quantity of water is available in the Thames area if it should ever be required. If adequate compensation was given to the various mill and riparian owners on the streams round London, a very large additional quantity of spring water might be taken beyond what is set out in the foregoing estimate, but the pumping of this additional water without adequate compensation would no doubt very naturally injure the mill and riparian owners having property on the various streams about London. An additional quantity of water from wells in the lower part of the River Lea is also available. When increase of population renders it necessary, provision may be made for storing flood water.

As to the pollution of the drainage areas, the really dangerous population, or that which cannot be controlled, and which is the scattered population inhabiting the rural areas, has absolutely diminished during the past forty years, and it is only in the urban districts and large villages that any increase has taken place, and in all these cases the pollution created by the population can be readily dealt with by the sanitary authorities, and, as a rule, in most of the urban centres, the sanitary authorities do perform their duty in an efficient manner.

In answer to questions, Mr. Baldwin Latham said that he took all the districts outside London which abstracted water from the area available for London that did not come again into the sources of supply. For example, the Colne Valley works draw water above the London intakes, and return it below Teddington Lock. Adding all these districts (which he named) to Registration London, he estimated that in forty years there would be in the area a population of 8,743,526 to be provided for. The consumption he would take at 31½ gallons per head per day for all purposes, much in excess of present use, thus giving 273,233,000 gallons,—or, say, 275,000,000. He had himself gauged all the streams round London except the Lea and the Wey, and he handed in the Lea gaugings, which showed that in the very driest time the Lea could be depended upon for 70,000,000 gallons a day, and the wells in the valley for 30,000,000 more, which probably came from the Colne Valley. Dealing with the sources he had named in the Thames Valley, he said that in the Epsom district there was an area of about 20 square miles, yielding at a minimum 180,000 gallons per square mile per day, Epsom took half a million gallons, might take three, and yet leave three millions, all underground water. The ten millions he had put down for the Wandale did not at all represent the area; and the Wandale lost water, a part of which found its way into the deep wells under London. The Wandale itself would supply 25,000,000 a day. What was pumped by the Kent Company could be more than doubled.

He put in a list of the mills on the various streams, with the number of water-wheels, the estimated horse-power, and the money value of the water-power. On the assumption that all the water he had indicated were required, mills on streams to which the water was not returned would have to be compensated by being supplied with steam-power. The rights of riparian owners, irrespective of the mills, would not be affected, because there would always be water in the streams as long as the mill-heads were kept up. In gauging chalk districts for many years, he had found, and had made allowance for, variations between rainfalls and stream flows, the Wycombe area, for instance, yielding much less than the Croydon area. He considered the construction of reservoirs in the Thames Valley quite feasible, and he had constructed storage reservoirs at Lechlade for 300,000,000 gallons for the late Mr. Campbell. In the Lea Valley there were sites on which storage reservoirs might be constructed. He had not personally surveyed them, but schemes had been brought out by Mr. Rendel and Mr. Milne. He knew some of the suggested sites, which were probably not in the best positions. There appeared to be some mistake about the two gaugings of the Thames in August 1887, as given by the Conservancy, for a higher flow was recorded by two independent gaugings by Mr. Pearce and Messrs. Taylor & Son.

The Chairman said that if particulars were handed in he would have them examined by the Assistant Commissioner.

Witness said he did not suggest pumping from the chalk in preference to reservoirs in the valley of the Thames. The time would come when both would be necessary. In these particular areas nothing more was wanted than the supplies he had indicated; and after these supplies the first thing would be storage reservoirs. In the first instance he would recommend increased pumping.

Thames Surplus Available for Storage.

Mr. R. W. Peregrine Birch, C.E., in his statement, said it appeared from the Thames Conservancy records that in a very exceptionally dry season the flow of the Thames past the companies' intakes at Hampton and Molesey may have fallen as low as an average of 281,060,000 gallons a day for a fortnight. This was the average flow from August 2 to August 15, 1887. The companies were then drawing 101,149,299 gallons, leaving 180,000,000 to pass by Molesey Lock and Weir. All this, less 5,000,000 gallons for navigation requirements at Molesey Lock, might be used for water supply purposes without any commensurate injury to other interests. The Mole and Hogg's Mill River, below the intakes, would in that case provide ample for the reach above Teddington Lock. There were, then, available from the river, in round figures, the following quantities per day:—

	Gallons.
Taken in August, 1887	101,000,000
Additional, available without injury	175,000,000
Total	276,000,000
Add from the Lea and chalk wells	34,000,000
Total available	360,000,000

The Lea and chalk wells provided 82,500,000 a day in August, 1887. The total was enough, according to Mr. Binnie, to give 30 gallons per head to 12,000,000 persons. If by improved management and fittings the quantity per head could be reduced to 20 gallons, then the 360,000,000 gallons would suffice for a population of 18,000,000. To the total must be added the supply obtainable from the chalk water, "the natural course for which to the sea is under the London clay." The water left in the Thames is of the same quality as that taken out. The abstraction of the Thames between Hampton and the New Richmond Weir, but this is unimportant, as no summer velocity is of any use for scouring purposes. The water can be maintained at the present summer or any other convenient height, and the volume of fresh water provided by the Mole, Hogg's Mill River, and Crane would keep the rivers sweet and pure for pleasure purposes, while the decreased velocity between Teddington and Molesey would be an advantage for boating. The Serpentine in Hyde Park is kept wholesome by a supply pumped to it from two wells.

With regard to the tidal portion of the Thames, Mr. Binnie, he thought, had been influenced by what he regarded as the matured opinion of Parliament, indicated by the rejection of the Grand Junction's application to remove their intake to Windsor in February, 1888. But the vote of the House of Commons was unduly influenced by irresponsible and extraordinary statements, which the promoters had no opportunity to refute; and it was very unlikely that any future application would be met in the same way. Any mischief caused by the lack of clean water at the point of sewage discharge must be remedied either by putting more clean water into the river at or above that point, or by discharging less sewage there. The non-abstraction of Thames water would increase the dilution of the sewage by 200,000,000 gallons; but by carrying the sewage twenty miles further down the river to Shellhaven seven or eight times more dilution would be obtained than would be given by the whole flow of the Thames.

Whilst regarding as unreasonable any restriction upon the amount the water authority may take from the Thames, he recognised the feeling against further abstraction, and therefore considered the storage space that might be required if additional water was to be taken without reducing the minimum flow below that already authorised. The lowest flows are re-

corded in 1887; and in such a year of drought no storage would be required for the present authorised abstraction of 130,000,000 gallons. But, if it were 25, 50, 75, or 100 per cent. more, the quantities to be taken would be as stated in column 1, the quantities to be taken from storage would be those in column 2, and the number of days when water must be partly taken from storage are given in column 3:—

	1.	2.	3.
	Gals.	Gals.	Days.
25 per cent. more	162,500,000	122,000,000	8
50 "	135,000,000	476,000,000	15
75 "	227,500,000	1,225,000,000	23
100 "	250,000,000	2,500,000,000	49

And there would be no day on which the water must be wholly taken from storage.

Examined upon this statement, Mr. Birch stated that he had devoted a large part of his professional life to the consideration of hydraulic subjects. In conversation with the Chairman he admitted that, if he had taken 175,000,000 gallons from the Thames when the discharge at Teddington was only 179.6 million gallons, he would have left only 4,500,000 gallons; but that did not alarm him, because, if the companies had taken every drop they could, leaving enough for Molesey Lock, they would not have appreciably injured any interest at all for that fortnight. It would probably be a century hence before so large an abstraction would have to be made. Reminded that there was a day in August, 1887, when only 153,000,000 gallons did go down, he said that the storage necessary for equalising a week's flow was a very small matter. "But this table," said the Chairman, which I confess rather startled me, "is without calculation for storage at all." Answer: "Without more storage than is necessary for equalising a fortnight's flow, and that is a very trifling matter indeed. I mean the companies have storage quite enough for the present moment." Witness handed in a table showing that for the fourteen days in August, 1887, the average flow at Teddington was 198,000,000, whilst the Companies had taken 101,000,000, making a total of 299,000,000, of which one-sixth was from the Mole and Hog's Mill river, leaving 281,060,000. Deducting the 101,000,000 taken by the companies, 180,000,000 were left to pass Molesey. It was certain that 175,000,000 gallons more than is now taken could be got in the worst season, without hurting anybody, and without necessitating any reservoir accommodation at all. Any interests that might suffer slightly could be compensated at a much smaller cost than would be incurred by getting water from any other source. Any reduction that was made in the water for the navigation below the lowest lock could be made good by a little dredging in the reaches below. The new weir at Richmond was to arrest the last half of the ebb tide. If the water could be arrested a foot higher than it was proposed to arrest it, and the foot of water were discharged in the last four and a-half hours of the day, the actual minimum flow of the river could be maintained, the scour of the river would be the same as now, the depth would be the same, and it would be in every respect the same as it is now at the four and a-half hours of the worst period of the flow. The summer flow is no good at all for scouring purposes. It is the floods and the freshets which keep the river scoured. The cost of taking the London sewage twenty miles further down the river would perhaps be one-tenth part of what it would be to bring clean water into London; and the point of out-fall indicated was that elected by Sir Benjamin Baker and Mr. Binnie.

We are obliged to break off here this week. We have in type some further evidence as to the reservoir schemes propounded by Professor Robinson and Messrs. Marten and Rofe; also a report of the somewhat searching examination which those engineers and their proposals underwent at the hands of the Commissioners. We are also holding over until next week some evidence as to the claims of Hertfordshire and as to well supplies.

COMPETITIONS.

PUBLIC BATHS, ROTHERHAM.—We understand that the designs submitted in this competition by Mr. Richard J. Lovell, of London, have been placed first, and those of Messrs. Mangnall & Littlewood, of Manchester, second.

Books.

Self-help in an Alarm of Fire; with Hints for Greater Safety. By R. W. BOYD, Associate of the Sanitary Institute of Great Britain. London: A. Boyd & Son.

THIS pamphlet, for it is no more, deserves the attention of all householders. It sets forth in plain language the possible causes of fire to be most guarded against, in an ordinary dwelling-house especially, and the best way of acting if a fire does break out. Some of the recommendations and criticisms have reference to public as well as private duties. The author remarks that as a house is never attacked by fire at the top and bottom at once, there is little to be feared (for life) if there is a safe and ready exit both above and below, and suggests that a proper fire-escape opening should be required by law at the top of every house. This would be an excellent arrangement, but it would almost require houses to be planned and constructed on purpose, and could hardly be well applied to existing rows of town houses as they stand. Most of the advice given, however, is entirely applicable to present circumstances, and we recommend owners and tenants, and persons in charge of schools or public buildings, to get it and profit by it.

Haddon Hall Illustrated. By W. E. COOKE. London: S. Philip & Son; Liverpool: Philip, Son, & Nephew; Nottingham: Norton & Co. 1892.

PROBABLY we shall not be wrong in assuming that the public attention which is being directed to Haddon Hall by the performance of the new operetta at the Savoy Theatre has been the main cause of the production of this folio of pretty illustrations of the old mansion. The illustrations are executed in that form of crayon lithograph which is much out of fashion with architects and artists, but is still popular with the public, and has the practical merit of giving a considerable degree of effect with comparatively little trouble. The interiors are the best, though the architectural details are very much slurred over. In short, the book is of no value to architects, but it is a pretty drawing-room table volume for the general public, who have no scruples of conscience as to architectural detail.

Dod's Parliamentary Companion, 1892. London: Whittaker & Co. and George Bell & Sons.

THIS well-known and well-nigh indispensable little book is now in its sixtieth year and sixty-seventh issue. No further testimony to its usefulness is necessary, for if it had not fulfilled its purpose it would not have enjoyed so many years of popularity and success. Its contents include not only lists of the members of the Houses of Lords and Commons, a list of all the constituencies, brief biographical and genealogical notices of Lords and Commons, and lists of officers of both houses, but a great deal of interesting and reliable matter, admirably arranged, in explanation of Parliamentary terms and proceedings. The issue now before us includes the new Parliament and Ministry.

The County Councillor's Directory. Edited by C. H. W. BIGGS. London: 139, 140, Salisbury-court.

THIS is the second issue of a very handy book of reference. It purports to contain a list of the aldermen and councillors for all counties and county-boroughs under the Local Government Act of 1888.

TRADE CATALOGUES.

The Raabon Brick and Terra-Cotta Company (Limited) send us their new catalogue, which is a well-got-up folio volume containing one hundred plates illustrative of their productions, which include moulded and diaper bricks, bands, string-courses, panels, cornices, balustrades, pilasters, capitals, corbels, vases and terminals, roof and ridge tiles, chimney-pots, and, in short, architectural details and features of all kinds in brick and terra-cotta, both for internal and external use. The mouldings are various and mostly well profiled. In regard to stock decorative work, of course architects as a

rule do not care very much for that, and their purpose it is better that such design should at all events be kept as simple as conventional as possible. The majority of the ornamental panels and string courses in the catalogue are, from an architect's point of view, too elaborate and too much in carving. The kind of things that may come usefully to an architect, as supplying the place of a moulded string-course, are such as Nos. 10 and 285, which are well-designed and sufficient simple to bear mechanical repetition; the others will be useful to many of those builders and estate agents who wish to put some architectural appearance on to their houses without having them specially designed by an architect.

The Wenham Company, Limited, of Upper Ogle-street, W., send us illustrated price-lists of their now well-known "Wenham" gas-lamps in new designs for indoor and out-door illumination. They also send an illustrated price-list of the "Wenham" louvre ventilators.

Mr. T. Freeman, of Phoenix-street, St. Pancras, N.W., sends us "Freeman's Handy Book," which, though not exactly a catalogue, contains lists of bricks, tiles, sanitary ware, &c., of all kinds. The lists are, in fact, quotation sheets, readily detachable from the book, and they are intended for use by builders and others seeking quotations from Mr. Freeman for the goods enumerated.

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ARCHITECTURE.

SIR,—In the *Builder* for October 22, 1892, p. 314, there appears a note containing a denial by Mr. Farrow of the remark attributed to him by Mr. Jackson, that as a matter of architectural education the preparation for the Institute Examination is perfectly useless. I was present at the meeting of the Architectural Association on December 11, 1891, and I certainly did hear Mr. Farrow make the remark in question. As Mr. Farrow's speech was made in the course of debate, it is very natural that this remark should have slipped his memory. As to your excellent reporters, I need only point out that they do not report verbatim, and occasionally use their own judgment as to what they insert or omit.

You also refer to an inference drawn by me from an advertisement published by an A.R.I.B.A. in these terms:—"Is this what can be called fair fighting?" The person in question had undoubtedly used the affix A.R.I.B.A. to advance his commercial interests, and I quoted his action as one amongst other instances tending to show that the reason for which the Institute diploma was sought was its supposed commercial advantages, with the natural consequences illustrated by my instance; and that, therefore, the Institute was wrong in supplying machinery which could be wrested to such a degradation of architecture. This, I maintain, was not only fair fighting, but a perfectly sound inference on the facts of the case.

REGINALD BLOMFIELD, M.A.

October 22, 1892.

** We are still of opinion that to select the escapee of a dishonest man who was using a title which he had no right to, as a typical instance of the kind of use which may be made of membership of the Institute, is an example of that kind of argument which is represented in the proverb, "Any stick is good enough to beat a dog with." If a dauber in some out-of-the-way district announced himself as "A.R.A.," in order to get commissions for pictures, would Mr. Blomfield consider that a reason for attacking the Royal Academy?

In regard to the question of what Mr. Farrow said, we may say that our report of that meeting was made with unusual care in consequence of the unusual interest of the discussion; that the editor of this journal was present and heard Mr. Farrow's speech, and does not remember any such strong expression; that our reporter does not remember hearing it (and it would have struck us both if we had heard it), and that Mr. Farrow himself says he did not use it, and that it does not represent his opinion; and Mr. Farrow is a cool and collected speaker, generally careful of his words. It is a case of three memories against two, and we are inclined to think Mr. Farrow is correct. Perhaps the subjoined note from him gives the true explanation.—Ed.

"DEAR SIR,—It is probable that Mr. Blomfield and Mr. Jackson may have at some time, or even at the meeting referred to, heard me express what is my opinion, that *cranning* is a perfectly useless preparation for the Institute examination, and, of course, *a fortiori*, 'as a matter (or means) of architectural education.'"
H. H. STATHAM, Esq.,
FRED. T. FARROW.

PARTNERSHIP IN ART.

Sir.—Your correspondent, "An Artist," in your issue of October 15, is far too ingenious. In the case he cites of architects in partnership...

What has he to say of those men who call themselves "artists in stained glass," who could neither draw a cartoon or paint a piece of glass if their very existence depended upon it. Of such there are a goodly number, and among them are University graduates, solicitors, clerks, tailors, iron-founders, oil and lead merchants, &c., &c., all posing as "artists in stained glass," and "some of us turning out a considerable quantity of Art (we mark it) from their works."

These people are, in the main, the worst of employers, and are notorious for the fact that they pay the lowest wages known in the profession to art-workmen. So well, indeed, do they know this, that, in order to keep their men quiet, a common practice among them is to keep a comparatively small staff, and to allow them, after doing eight or nine hours' work in the shop, to take their work home with them in order to make up a decent...

One of these so-called artists has at present in his painting rooms nine men and about ten or more boys and youths varying in age from thirteen to sixteen years, these latter receiving in wages from 1s. to 18s. per week.

Yes, Sir, "manufacturers" and "dealers" are the right names for these people, and many glass artists sincerely hope that you will open your columns to the discussion of this subject of partnership in art, especially as applied to stained glass, and that the result may be to peeze out of existence this unnecessary class of craftsmen.

AN ART WORKMAN.

THE FIFTEENTH-CENTURY MADONNA.

Sir.—Oh, horror! Is Mr. Vallance going to copy the fatal mistake of nine-tenths of our modern "restorers," and be as interesting as the noble fifteenth-century figure with "Churchwarden's Gothic"? If he wants to destroy all its intrinsic worth let him do it; but his reward will be an unmeasured condemnation of all persons of taste, whether artists, connoisseurs, scholars, or antiquarians. I knew an instance of a fifteenth-century font in a church that was taken in hand by "restorers" (a by-word now for "destroyers"), and had the old font booled all over to make it look neat and clean. A storm of not very complimentary names was soon hurled at the empty heads of those who had done it. Would he patch and repair his antique with wood from the carpenter's shop, and make a new thing of it, or stain the iron work to make it look like silver? Would he use the tool ever Cleopatra's Needle on the Embankment, and patch the defective places with fresh married granite? The one would be as reasonable as the other. Has the figure lost parts of the rapery and hands by the looth of Time? Well, the more the pity that it should be so, but that historicure cannot be helped. What remains is, at all events, to maintain its interest. Its rock is sacred, for it was done by hands that have gone to dust some centuries ago. Let it alone—lot alone. P. O. HUTCHINSON.

VESTRIES AND HOUSE-DRAINAGE.

Sir.—Will you kindly allow me to correct the following errata which occur in my letter of last week?

"Nine in. by 6 in. pipe where 4 in. should be," should read, 9 in. and 6 in. pipes where 4 in. should be used."

Further on, through my accidentally omitting a couple of words, my remark reads that the trap is big enough for a town, whereas I meant to call attention to the absurd size of the drain.—viz., 9 in. J. KEMSLEY.

PUBLIC LIBRARY, Ayr.—Mr. Campbell Douglas writes to say that this building should have been described on p. 325, ante, as by Messrs. Campbell Douglas and Morrison, architects, and not ascribed to the former only. The mistake was not ours.

STRIVESHOP APPOINTMENT.—At a general meeting of the Trustees of the Rugby Charity, held at the Judge's Lodgings at Warwick on the 24th inst., the trustees appointed to the vacant Surveyorship of their Middlesex estate Mr. Charles K. Bedells, F.S.I., and Mr. C. Herbert Bedells, F.S.I., practising as architects and surveyors in London, under the style of "Lander & Bedells." The estate, which consists of about 180 properties in the neighbourhood of Bedford-row, adjoins the larger estate of the Harpur Bedford Charity, which since 1852 has been under Messrs. Lander & Bedells' management. The incomes from these two estates go to the maintenance of the large public schools at Rugby and Bedford, having been devoted to that purpose by their respective founders, Lawrence North, grocer, of London, and Sir William Harpur, Lord Mayor of London.

The Student's Column.

CONCRETE.—XVIII.

AGGREGATES, MIXING, ETC.

FOR small quantities, the most convenient method of breaking stone and brick for aggregates is with an ordinary stone-breaker's hammer, but when large quantities of concrete are required, breaking the aggregate with hammers is slow and very expensive. Besides this, the stones broken by hand are too uniform in size to make the best concrete; experiments have shown that machine-broken stones give better results. There are several kinds of stone-breaking machines made nowadays, from the hand-power machine, which one man can work, to the powerful machine which will turn out about ten tons of 2 in. cubes in an hour. Machines of the "Blake" type break the stone by means of a movable jaw, which cracks the stone between itself and a fixed part of the machine. Others, such as Messrs. S. Mason & Co.'s (Leicester) "Continuous Stone Breaker," consist of a vertical cylinder in which a toothed or grooved cone is placed base downwards, the base of the cone being slightly less than the internal diameter of the cylinder; the stone is fed into a hopper over the cylinder, and is crushed between the cylinder and the cone by the revolution of one or other of them, according to the purpose for which the machine is intended to be used. It is said that it will do nearly twice as much work as any jaw stone-breaker. Other machines crush the stone between rollers, and will turn out aggregates in pieces from 3 in. down to 1/4 in., or, with finer rollers, will grind the stone to sand.

In all aggregates broken by machinery there is a certain amount of dust, which detracts somewhat from the strength of the concrete; this dust is sometimes removed by means of a blast of air, but more usually by washing the broken material immediately before mixing it with the cement. Some experiments, carried out for Sir John Coode in 1873, show the weakening effect of this dust. The sand, which was formed during the crushing of syenite for concrete purposes, was made into six briquettes, with an equal quantity of Portland cement; other six briquettes were made with the gritty portion of the same sand, the impalpable powder being removed by a blast of air. The latter briquettes, at the end of seven days, were 18 per cent. stronger than those which contained dust.

Size of Aggregate.—The smaller the size of the aggregate the smoother will be the surface of the finished concrete, but a small aggregate gives weaker concrete than a large one with the same amount of cement. The size of the largest pieces varies in different specifications and for different purposes. For concrete in large masses, as in breakwaters, dock-walls, &c., it is best to have an aggregate ranging up to a considerable size, the largest pieces being such as will just pass through a 3, 3 1/2, or even 4 in. ring. The same reasoning we employed to explain the advantages of coarse sand over fine sand (Chapter XIV.) applies to the aggregate; the greater the number of pieces in a given quantity of aggregate the larger is the extent of surface to which the mortar has to adhere, and consequently the greater must be the excess of the mortar over the voids. But there is a limit of size which it is not advisable to exceed. This limit was fixed by the Metropolitan Board of Works in 1872 at 2 in. for all concrete in buildings, but there is no doubt that, for foundations and walls more than 12 in. thick, an aggregate containing some larger pieces would prove, strength for strength, more economical. Pieces too large have a tendency to wedge together and to leave cavities in the concrete; they should be laid separately by hand as packing in the different layers.

It is not often that the size of the largest pieces of the aggregate is allowed to exceed 4 in., even for concrete in large masses, as in breakwaters. For the foundations and walls of buildings, and for retaining walls, the limit of size may be placed at 3 in., or one-sixth the thickness of the foundation or wall, if this be less than 18 in. and more than 7 in. In London, of course, the maximum limit is fixed at 2 in. for all concrete in buildings. For walls and floors less than 7 in. thick, the limit of size may be placed at one-fifth the thickness of the concrete.

Packing.—Considerable saving can be effected

by packing rough stones into the concrete while it is being deposited. This is sometimes done to the extent of 20 per cent. of the total bulk of the wall. In heavy engineering works, some of the stones thus inserted contain a cubic foot or more, but in buildings smaller pieces must be used according to the thickness of the wall or foundation. Care must be taken that none of these lumps of stone are placed within 3 in. or 4 in. of the face of the wall or of each other, and the concrete should contain a proportionate excess of mortar in order that the packing may be properly united with the rest of the mass. It must be remembered that the difficulties of superintendence are much increased when packing is specified as there can be little check on the quantity of packing which a contractor can put into a wall. For this reason it is better, in contract work where the constant supervision of a clerk of works is not available, to forbid all packing and to use a well-broken aggregate, irregular in shape and size, and containing, therefore, as small a quantity of voids as possible. In this way, the cement will bind a larger quantity of aggregate, and the cost entailed by forbidding packing will be, to some extent, reduced.

Measuring.—The various ingredients must be carefully measured in boxes separately. For rough work, carried out by the owner's workmen, the aggregate may sometimes be measured with sufficient accuracy in wheelbarrows, a certain number to each bag of cement. But for all concrete which may be subjected to considerable stress and for all contract work, each ingredient must be measured in a box. On no account must any deviation from this rule be allowed, for without accurate measurement the concrete cannot be of uniform strength, some portions will have too much cement and some too little, and the latter will be the measure of the strength of the concrete. And in addition to this lack of uniformity, it is quite possible that the proportion of cement used will be less than that specified, and in this case the whole mass suffers.

The quantity of concrete which can conveniently be mixed by hand at one time does not exceed one cubic yard, but it is better to mix less than this, especially if the concrete be fine (as for thin walls, floors, &c.) or the cement be quick-setting. Having decided upon the amount of aggregate to be measured, it is easy to calculate the size of the boxes required for that and for the other ingredients. There are several methods of measuring the ingredients. Sometimes a bottomless box or frame is used for the aggregate, and this is placed on the mixing board and filled level with the top; upon it then is placed another bottomless box of the same length and breadth but of smaller depth, varying according to the specified ratio between cement and aggregate,—and this box is then filled with cement and struck level with a straight-edge. The best method, perhaps, is to fill the aggregate into a bottomless box as above, then place on it another similar box of suitable depth and fill it with sand; lift the two boxes by the handles in their ends, and the sand is spread over the aggregate; the cement must be measured in a box (with a bottom) and emptied over the heap. For instance, in the case of concrete specified to be composed of 1 part cement, 2 parts sand, and 4 parts broken stone, the stone could conveniently be measured in a frame 4 ft. by 2 ft. 6 in., by 2 ft. deep, the sand in a similar frame 1 ft. deep (or preferably in one rather deeper, say 3 ft. by 2 ft. 6 in., by 1 ft. 4 in. deep), and the cement in a proper box 2 ft. by 2 ft., by 1 ft. 3 in. When large shallow boxes or frames are used, there is more liability of inaccurate measurement. In exposed situations, the mixings should be done under cover, so that the cement may not be carried away by the wind.

Washing the Aggregate.—We have already pointed out the dangers which may arise from the use of dirty aggregates, and have stated that these can be obviated by thoroughly washing the aggregates. The washing can most conveniently be done immediately before mixing the concrete, and can be carried out on the same platform, although it is better to have separate platforms, as the slope, which is required in the washing-platform, may cause cement to be carried away if the platform be used for mixing purposes. The washing-platform may be of boards or planks, and must be laid with sufficient inclination, so that the dirt can be easily removed by the water. The material should be shovelled backward and forward by

one or more men, an ample supply of water being at the same time poured upon the heap by another man. Thorough agitation of the aggregate and a plentiful amount of water are needed, and the operation should be continued until the effluent water shows little trace of impurity. The washing of the aggregate leaves it in a damp state, and, therefore, in the best condition for making strong concrete. Where washing is not adopted, the aggregate ought to be sprinkled with water before using, as a dry aggregate absorbs moisture from the cement, and leaves it without sufficient water for its proper hydration.

Mixing.—There are two ways of mixing concrete, the "dry" and the "wet;" the former is the method usually adopted in England, the latter is common in France; the name *béton* has been applied to concrete made in the French way. For cement-concrete the English method is the best, for lime-concrete the French has the advantage.

Concrete can be mixed either by hand or by machinery, the latter for large quantities being considerably more economical. Mr. Bernays, in 1880, recommended the mixing of concrete by hand, for the reason that machines cannot be fixed as near the place of deposition or moved as easily as simple wood platforms can; at the same time he acknowledged that some machines did their work perfectly. Since that time, however, machines have come more and more into use, and nowadays many are employed by building contractors, although they are not, of course, as large and powerful as those used in harbour-works and the like. For small quantities of concrete, that is to say, in the great majority of buildings in which concrete is used, mixing by hand is almost invariably adopted.

Hand-mixing requires considerable care. The points to be aimed at in "dry" mixing are the following:—The platform should be as near the place of deposition as possible. The sand and the broken material or gravel must be turned over so that the voids in the latter are filled by the former; the cement must be distributed equally throughout the whole; sufficient water must be added so that it may cause the cement to form a thin film around every particle of sand and fragment of larger material, but not enough to wash away the cement; with quick-setting cement the operations must be rapidly completed. Mr. Grant recommends that the ingredients be turned over at least three times dry, the water then added, and the whole mass turned over three or four times wet. It is not often, however, that so much manipulation is specified; more commonly it is specified that the materials shall be turned over twice dry and twice wet. Sometimes the operation is performed entirely with spades, either two or preferably more men being employed, and the heap being thoroughly turned over by them in shovelling it from one part of the mixing-platform to another, and back again; the materials have then been turned twice dry. Water in proper proportion is now sprinkled upon the heap by another man through a rose; if the water be poured from pails, it is probable that some of the cement will be washed away and that excess of water will be used. The materials are again turned over during the operation of sprinkling, and after a fourth turning the concrete should be ready for use. Sometimes, in addition to the two or more men with spades, another man with a large two-pronged rake is employed to rake the ingredients to and fro as they are turned by the spades; this is an improvement on the other method.

Sometimes the cement and sand are first carefully mixed and afterwards the broken stone is added, the whole is then well turned over before the water is added, and again afterwards. This method has much to recommend it.

In the French method of mixing *béton*, the lime or cement and sand are first made into mortar, and this is then mixed with the broken stones, &c. When lime is the matrix employed this system is the best. The lime, if in lumps, can be thoroughly slaked, and can in any case be ground in a mortar mill, thus eliminating the danger of blowing which may result from the hydration of coarse particles of lime after the fine portion has set. The mortar may be mixed in the proportion of 1 part lime or cement to 1½ or 2 parts sand. Lieutenant Wright thus describes the operation of making *béton* at Boston (U.S.A.):—"The concrete was prepared by first spreading out the gravel on a platform of rough boards, in a layer from 8 in.

to 12 in. thick, the smaller pebbles at the bottom and the larger on the top, and afterwards spreading the mortar over it as uniformly as possible. The materials were then mixed by four men, two with shovels and two with hoes, the former facing each other, and always working from the outside of the heap to the centre, then stepping back, and recommencing in the same way, and thus continuing the operation until the whole mass was turned. The men with hoes worked each in conjunction with a shoveller, and were required to *rub well into the mortar* each shovelful as it was turned and spread, or rather scattered, on the platform by a jerking motion. The heap was turned over a second time in the same manner, but in the opposite direction, and the ingredients were thus thoroughly incorporated, the surface of every pebble being well covered with mortar. Two turnings usually sufficed to make the mixture complete, and the resulting mass of concrete was then ready for transportation to the foundation. The success of the operation, however, depends entirely upon the proper management of the hoe and shovel, and though this may be easily learned by the labourer, yet he seldom acquires it without the particular attention of the overseer."

OBITUARY.

DR. AUGUST VON ESSENWEIN, the curator of the Arts and Crafts Museum at Nuremberg, has died of heart disease, at the age of sixty-one. He had studied architecture at Vienna under Ferstel, and had held various posts of importance, such as City Architect to Graz. In 1866 he was invited to take office at the Nuremberg Museum, and in the twenty-five years of his curatorship the collections were greatly extended and entirely rearranged. He himself designed the extension of the old museum buildings, drawing every detail, including the coloured glass, and it was this building, together with an extension of the Town-hall of Nuremberg, which gave him the repute of an able architect as well as an invaluable custodian of some of Germany's important art treasures. A great number of his writings from his pen have appeared in the *Nuremberg Museum Gazette*; of others we would mention his "Medieval Brick Architecture in North Germany" and his "History of Fire-arms." It will be exceedingly difficult to replace him.

HERR JULIUS HENNICKE, late of the firm of Von der Hude & Henicke, of Berlin, has died at the age of sixty. He was well-known throughout Germany as a hotel specialist, the large Central and Kaiserhof hotels in Berlin among many others being built from his drawings. The new Lessing Theatre was one of the last buildings of the firm as such, which, by the bye, was one of the first firms of so-called private architects to be established in Berlin when only Government architects practised in that city. Herr Henicke in reality introduced the fine new covered markets in Berlin; boasts of; and of other municipal work we may mention a great slaughter-house built from his plans at Buda-Pesth in 1871.

GENERAL BUILDING NEWS.

ADDITIONS TO THE OXFORD UNIVERSITY MUSEUM.—A large addition, says the *Oxford Times*, is being made to the University Museum, Oxford, for the department of Human Anatomy. The extension is on the east side of the main building abutting on the park, and the main entrance is on the north by 29 ft., a working lobby there is a tank-room 60 ft. by 29 ft., a preparation-room, coal-cellar, attendant's rooms, general stores, and the usual offices. The principal rooms on the ground floor are the dissecting-room, 60 ft. by 30 ft.; museum, 30 ft. by 40 ft.; and a lecture theatre, the latter being 30 ft. square. The museum has a gallery running all round at the height of 11 ft., and both the dissecting-room receive light through the roof from the north side only, to avoid the glare of the sun. Rendle's patent system of glazing being used. The microscopical room, which is 18 ft. by 30 ft., is on the first floor, where there are also two assistants' rooms. At the north-east angle of the building is a large lantern over the lecture theatre, together with a ventilating shaft, and the principal features in the north elevation are the octagon turret, and the gables and dormers over the windows. The chief decorative work, however, is the window lighting the museum in the east elevation, balustrade being placed round the lecture theatre. The stone used is box-ground, from Bath, and pugging is used between the principal floors to deepen the colour. The builders are Messrs. Symm & Co., Oxford, the architect being Mr. H. Wilkinson Moore, also of Oxford, and the clerk of the works Mr. R. England. Externally the building is of freestone, like the rest of the Museum, but it is roofed with tiles instead of slates.

ST. ANDREW'S CHURCH, PAIGSTON.—On the 5th inst. Mr. Sampson Hambury, High Sheriff of Devon laid the foundation-stone of the St. Andrew Church, Sand's-road, Paigston. The actual work of erecting the church, for which Messrs. Fulford, Tait, & Harvey, of Exeter, are the architects, was commenced a month or two ago. The contract for the first section, which comprises the sanctuary, choir, morning chapel, priests' and choir vestries and tower up to the lower chamber, was secured by Mr. E. P. Bovey, of Torquay, for 2,552*l.* The total cost of the whole building is estimated at 6,550*l.* The style is based upon that of the French fourteenth century period. When completed the church will accommodate 600 persons, in addition to the clergy and choir. The building will be executed in local red rock, with box ground stone dressings externally, and Ham Hill stone dressings internally. The flooring of the chapel and vestries will be laid in wood blocks, and that of the chancel will be of wood blocks, and that of the steps to the sanctuary will be of Devonshire marble, and the columns supporting the arches will be of the same material. Behind the altar space is given for the erection of a reredos at a future time. The roof over the chancel and morning chapel will be of oak, while that portion of the latter which is situated in the tower will be covered by groined iron-tile rafting. The building will be heated with hot water, the chamber for which is included in the present contract. Mr. J. Pullen is clerk of the works.

MUNICIPAL BUILDINGS, MORLEY, YORKSHIRE.—On the 8th inst. the foundation-stone of the Morley Municipal Buildings was laid by the Mayor of the borough (Alderman Clough). The buildings when completed, says the *Leeds Mercury*, will comprise Municipal Offices, Borough Court, Police Department, and Town-hall. The site is bounded on the east by Queen-street, on the south by Albion-street, on the north by Wellington-street, and on the west by an intended road 10 yards wide. From back to front the ground falls about 19 ft. On the ground floor there will be on the left of the principal entrance the Town Clerk's and Borough Accountant's offices; to the right the Surveyor's and Nuisance Inspector's offices; along the floor on the right will be the Borough Court, Magistrates' Retiring-room, and Magistrates' Clerk's rooms, with the witnesses', solicitors', and Magistrates' Clerk's office to the rear. The public entrance to the Borough Court will be from the intended road, and that for the magistrates by the principal entrance in Queen-street. In the court a gallery is to be erected for the use of the public. The Town-hall is to be on this floor at the south-west corner facing Albion-street and the intended road, 90 ft. long, 46 ft. wide, and 36 ft. high, entered through the central hall direct from the main entrance in Queen-street, and with two additional entrances from Albion-street. At the northern end will be an orchestra the full width of the room, under which are to be the retiring-rooms for the performers; at the opposite end will be a large gallery, with a balcony on each side, having tip-up seats fixed in position, the total accommodation being for 1,200 persons seated. The second floor is to be approached from the main staircase in the centre of the building, and will have a large waiting-hall or gallery giving access to all the rooms on this floor. At the south-east corner of Queen-street will be the banquetting or reception room, with a small committee or serving room attached. At the opposite, or north-east, corner there will be the Council-chamber, with Councillors' ante-room and retiring-room and Mayor's parlour, with waiting-room and large committee-room, the latter being connected with the banquetting-room by folding doors. The lower ground-floor will be about level with the south-east corner, next Queen-street, the ground being excavated from front to back with large areas for light. The following rooms are being provided for the different departments, viz.:—Offices for the payment of rates, water inspector and sanitary inspector, with meter and sample rooms, weights and measures and reading-room. The police department is to the north at the upper end of Wellington-street, and immediately under the magisterial portion on the floor above. It will have a separate entrance from the street to the charge-room, inspectors' and superintendents' rooms, day or paradoro, inspectors' cleaning, lamp, and store-rooms, and to the cells. There are eight in number, one being an association cell, and are all placed in the interior of the building. A doorway from the prisoners' corridor will lead to an area which will serve as an airing and exercise ground. At the north-west corner will be the caretaker's house, consisting of kitchen, two bedrooms, pantry, &c. Underneath a portion of the large hall, next to Albion-street, will be the minor hall, to seat 600 persons, 70 ft. long, 46 ft. wide, and 16 ft. high, with a platform at one end, connected with the performers' retiring-rooms before mentioned. A general kitchen will be provided, with scullery attached, constructed in the roof, on the south side. It is proposed to heat the large rooms by hot water on the low pressure system, and the offices with open fireplaces. The whole of the ashlar used in the building is to be from the Morley Quarries, all lined with brickwork throughout. The designs

on which the building is being erected were prepared by Messrs. Holton & Fox, of Dewsbury, and selected from a number of competitive designs sent in. The contractors, and the amounts of their contracts, are as follow:—Masonry, Messrs. J. Schofield, Sons, & Co., Leeds, 12,456*l.*; Joining, Mr. Thomas Storey, 390*l.*; ironwork, Messrs. James Clegg & Son, 3,084*l.*; plastering, S. Johnson & Son, Mirfield, 1,060*l.*; ironwork, Messrs. Firth & Clay, Dewsbury, 348*l.*; slating, Messrs. J. Atkinson & Sons, Leeds, 288*l.* Mr. Henry Clarke is clerk of the works.

RESTORATION OF GULVAL CHURCH, CORNWALL.—Gulval Church, near Penzance, was re-opened on the 10th inst., after undergoing restoration, by the Lord Bishop of Truro (Dr. Gott). The parish church of Gulval, says the *Western Morning News*, was one of the cruciform Cornish churches built in the early part of the fourteenth century, and apparently remained intact for two centuries, and then extensive alterations were made. The south transept and south aisle were then removed, and the painted old tower erected. Further renovation became necessary about thirty-five years ago, and the church was re-seated, the aisles running parallel to the end granite windows were erected. Since then no alterations have been the replacing of a two-light window in the east end of the chancel by one of five lights, and filled with stained glass. About two years ago, however, a great quantity of the ceiling of the church fell away, and Mr. J. Piers St. Aubyn, of Marazion, was requested to examine the roof and prepare a report. He reports that the timbers supporting the roof had become rotten, and there was a danger of some portion of the roof collapsing, whereupon it was decided to construct a new roof, and generally to effect a thorough renovation. A new transept on the north side of the nave, to be known as the Dolittle Chapel, has been built. The transept was fitted with stained glass by Messrs. Heaton, Butler, & Bayne. Under the window an alabaster arcading has been constructed. In addition to the transept, the north chancel aisle and the north-west aisle have been built, the former for use as a clergy vestry and to contain the enlarged organ. The chancel has been fitted with oak stalls and paved with polished Plymouth marble. The benching of the chapel is of carved oak. The paving outside the benching is of Plymouth marble, and on the east the chancel is divided from the organ-chamber by a glazed screen of oak. The transept is fitted with pitch-pine benching, and the gangways paved with red tiles. The north-west aisle contains a four-light window, in memory of Mr. S. Balthe, and all the memorial windows, which occupied various positions in the north wall of the church, have been rebuilt in the new north wall. The work has been carried out by Messrs. Carah & Edwards, of Praze; the alabaster work by Mr. Earpe, of London; the marble pavement by Messrs. Goad & Co. of Plymouth; the ironwork by Messrs. Holman & Son, of Penzance; the Fontaine & Son, of Stonehouse; and the plumbing work by the late Mr. J. Mowatt, of Penzance; the whole being superintended by Mr. J. Piers St. Aubyn, the architect.

NEW CHURCH, HULL.—The new Church of St. Augustine's, situate in Queen's-road, Newland, Hull, was opened by the Bishop of Beverley on the 10th inst. The architect is Mr. G. Gilbert Scott, and the edifice consists of one wide nave and one aisle. It is in the Late Decorated style, built of brick, with stone facings, and the interior arches of red Hollington stone. The interior roof is of pine. A special chamber and gallery are constructed for the organ on the north side of the church. The tower contains a gallery, with chambers for bells. The seats are of pitch-pine.

NEW COLLEGE BUILDINGS, BRISTOL.—The New Medical School of the Bristol University College, which has been for the past year in process of construction, says the *Bristol Times and Mirror*, opened for classes on the 4th inst. The old buildings, designed for a temporary purpose, have long been felt inadequate. The new building, which is part of the future grand front, is erected in local red Pennant stone, with dressings and moldings of Coombe Down freestone. Entering from the main aisle, under a deeply moulded arch, a lobby is passed, conducting into a large hall, whence access is gained to the various departments. The medical museum, on the right, is 50 ft. by 30 ft. There are also rooms for the faculty meetings, medical tutors, students, &c., together with cloak-rooms, there being access by a glazed door-way to the old aisle. It is the interior of which has been modified and renovated. From the hall, which is floored with mosaic, rises a wooden staircase, leading to the first floor, on which are a physiology theatre for about fifty students; a large laboratory; a professors' preparation room; and a library 30 ft. by 30 ft., lighted on three sides by traceried windows of leaded glass, and having a Gothic open-timbered roof, with hammer-beam principals. The scheme has been completed under the superintendence of Mr. F. Bligh Bond, architect, of Bristol; and Mr. George Humphreys, of Bristol, was the contractor. The buildings have been warmed by Messrs. Crispin

& Son, engineers, of Bristol. The ornamental lead glazing was supplied by Messrs. Moon & Son, and that of the large staircase lights by Messrs. Bell & Son, both of Bristol. The carving has been done by Messrs. Davey & Bushell. The engineering work will probably be completed early next spring. The ground floor is a workshop and casting-shop of about 70 ft. by 34 ft., with a boiler-house in connexion with the same. Above will be two floors, the first devoted to engineering lecture-rooms, and the second will provide a series of drawing and class rooms. The cost of the completed buildings will be about 4,000*l.* The building, when finished, will form the south side of the great quadrangle, which is designed to lie back from the road front. The existing L-shaped portions of the University building will therefore form the north and east sides of the quadrangle. The architect for this section is also Mr. F. Bligh Bond; the contractor is Mr. William Church, of Bristol.

FOREIGN AND COLONIAL.

FRANCE.—According to the proposals of the Section of Architecture, the Académie des Beaux-Arts decided last week that the prize founded by M. Bailly, the much-regretted President of the Society of French Artists, should be awarded to a French artist for a completed building, or to a French author for a work on architecture. The prize will be given according to the following rules:—Two consecutively for a completed building, the third time for a publication. The prize will be given for the first time to the architect of the best building erected during the last six years.—The landscape painter Gosselin, curator of the Museum at Versailles, is very seriously ill.—The Jury of the Ecole des Beaux-Arts has awarded the medals for 1892 as follows:—Painting, M. Mitrosey; Sculpture, M. Ripard; Architecture, M. Desperthes. This same pupil has also obtained the Prix Abel Blouet. The Prix Jay has been bestowed on M. Chanut. We may also mention that out of the 971 young people admitted to the School course 501 are architects.—Fifty competitors have taken part in the open competition for the decoration of the Salons d'Introduction of the Salle des Fêtes at the Hôtel de Ville. The designs, which are on view at the Palais des Beaux-Arts will be judged this week. The sum allowed for each Salon is 60,000 francs.—M. Dalon has just been definitely commissioned to execute the monument to be raised by public subscription to Alphonse. This monument, which is to be erected in the Square of St. Jacques la Boucherie, close to the Boulevard Sébastopol, consists of a semi-circular erection, with an interior decoration of bas-reliefs, representing works directed by the eminent engineer. In the centre is the statue of Alphonse on a pedestal, and surrounded by workers, to whom Alphonse gives orders.—To-morrow, October 30, the official inauguration of the new Pont de Confans will take place. The bridge, which was begun two years ago, unites the Communes of Charanton-le-Pont and Irvy-sur-Seine.—The old church of Bougival, which has been almost in ruins, is now being demolished. The old clock is to be preserved and restored; the new church will cost 700,000 francs.—Some workmen have just discovered at Guise (Aisne) the foundations of a Roman city dating from the first century of the Christian era; they have also found remains of some wall-paintings, some shaped flints, and a hatchet. These various remains prove without doubt that the old city occupied the site of what is now the Rue Camille Desmoulins.—A statue has just been erected to Pagnier, the Maréchal des logis of the 12th regiment, who was the first French soldier killed at the commencement of the war of 1870.

NIEUCHÂTAIN.—In the court of the Police station at Angers, a sarcophagus has been discovered, containing the body of a Bishop, in his robes, with a paten in gilt copper, of the thirteenth century, by his side, a gold episcopal ring with a blue stone, and a finely-carved cross. From certain documents found at the Bishop's Palace, where the bones have been taken, this tomb appears to have been that of Michel Ataviz Villouazeau, Bishop of Angers, who died in 1260, and was buried in the choir of the chapel of the Jacobins, which he had built, and where now stands the Gendarmerie. The different objects found have been placed in the Museum of St. Jean at Angers.—On November 12 the new hospital for convalescents will be opened. It has been built by the Administration of Civil Hospitals at Lyons on the (almost) island of Givis, near Hyères.—The Municipal Council of Rochefort have just decided to construct large barracks for the Infantry on the plateau of Sainte Sophie, near the town.—A magnificent tomb has just been inaugurated at Saint Geniez (Aveyron) in memory of Madame Pauline Talabot, a former director of the railways of Paris, Lyons, and the Mediterranean. This monument has been made from the designs of MM. Lucien Magoe, Ernest Barrias, and Puech. The monument is 13 metres high, and forms an open loggia, the dome of which is supported by four massive columns, under which the statue of Madame Talabot draped in a mantle and kneeling in prayer. In the angles are represented the four

principal scenes in the Passion. The monument has been entirely made in Paris, and has cost 150,000 francs. Twelve wagons were employed to convey the enormous mass of stone and marble.—The death is announced, at Tours, of M. Alfred Didier, historical painter. He was born at Paris in 1840; was a pupil of M. F. Barrias. We may mention amongst his principal works the following:—"The Interview of Mdle. de Sombreuil and General Hoche" (1866), "Théâtre de Méricourt" (1869), "Death of Bayard" (1879), "Victory at Wissembourg by General Hoche" (1887), &c.—M. Charles Eugène Chagnat has just died at Dijon, at the age of sixty-eight. He was a very fine miniature painter.—The Service des Beaux-Arts of the Ville de Paris is now restoring the famous "Chevaux de Marly" which stand at the entrance to the Champs Elysées. In order to preserve these specimens of eighteenth-century art, it is still a question whether they shall not be removed to a museum and replaced by bronze casts.—We hear of the death of M. Emile Pouget, Paris, architect, member of the Société Centrale des Architectes. M. Pouget was only forty-eight.

VIENNA.—Messrs. Felner & Helmer have been commissioned by the Municipality of Wiesbaden to build a new theatre in that city. According to contract, the theatre is to seat 1,400 persons, and is not to cost more than 1,590,000 marks (75,500*l.*). If the work can be commenced during the present month, the architects promise that the structure shall be ready in September, 1894.

BERLIN.—The Emperor, on his return journey from Vienna, stopped at Wittenberg to inspect the historical Lutheran church (Die Schlosskirche), which has been restored by his command. Professor F. Adler, the eminent archaeologist, who had acted as architect on behalf of the Prussian Board of Works, was in attendance, together with the master-workmen employed on the building.—There is to be a monument erected in memory of the late Empress Augusta, who had given much time to the charitable institutions of the capital. A limited competition for the design will be opened. Five eminent sculptors have been invited to send in models.—Herr Dr. Zelle has been made chief "Bürgermeister" of Berlin, the Emperor signifying his approval to this election. Dr. Zelle's architecture view an art will find a friend, and there will probably be a new régime in the Municipal Board of Works.—A new building for the Royal College of Music is to be put up by Herr "Baurath" Schwechten in the Potsdamer-street, but at a considerable distance behind the street frontage line.—Professor J. Lessing, the curator of the Arts and Science Museum, has read an important paper on the design of modern German furniture.—The electric lighting in the main thoroughfares of Berlin is to be greatly increased next year. The electric light will also be used on the "Schlossfreiheit" in front of the Royal Palace.—"Gardens, Fountains, and Monuments" will be the subject of a series of lectures by Dr. J. Springer at the "Kunstgewerbe" Museum. The subject has not been systematically treated before in Berlin, and the lectures are expected to excite some interest.

MISCELLANEOUS.

GLASGOW INSTITUTE OF ARCHITECTS.—On the 18th inst. the annual meeting was held in the Religious Institution Rooms, Glasgow. Mr. William Leiper, A.R.S.A., presiding. The twenty-fourth annual report showed that there were forty-nine ordinary and seven honorary members in the Institute. Great interest was shown by the Institute during the session in the preparation by the Corporation of a Building Act for Glasgow. The Bill had now become law, but it was gratifying to be able to report that various clauses which had been objected to by the Institute had been deleted or modified. Mr. T. L. Watson said that any action they had taken in the past had been taken only with the view of ensuring good building.

THE MASON COLLEGE ENGINEERING SOCIETY, BIRMINGHAM.—The opening meeting of this College for session 1892-93 was held in Mason College, Birmingham, on the 19th inst., when Prof. Robert H. Smith delivered a presidential address on "Technical Education; its Use and Abuse: What it can do and what it cannot do." Prof. Smith divided the whole of education into three stages,—1, preliminary and general; 2, special, i.e., professional or technical; and 3, the subsequent training received through the experience of practical work and life. The third stage was the most important, not only as being longer and more difficult, but as affording wider opportunities. He next insisted strongly on making the initial stage liberal and general in character, and of continuing it until the age of at least thirteen for relatively poor boys and girls, and to from fifteen to eighteen for those better off. He complained of what he characterized as the one-sided nature of the teaching of the present school system, and said that it required development not only on the Natural Science side, but also in the direction of training in skilled manual labour. He did not much care what kind of labour was employed as the means of this.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Design to be delivered.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

Those marked with an Asterisk (*) are advertised in this Number.

CONTRACTS.—Continued.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in.

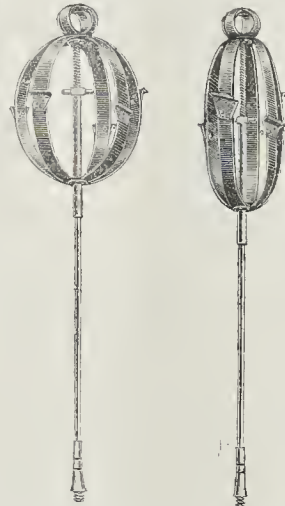
training; but he insisted that it was a viciously narrow and illiberal training that made no effort to cultivate among all classes an intelligent comprehension of, and sympathy and respect for, what must remain the life-work of the vast bulk of mankind.

FURNESS ABBEY SAID TO BE IN DANGER.—According to the Kendal Mercury, the ruins of Furness Abbey are in a bad way.

HELLIWELL'S PATENT GLAZING.—We are asked to mention that the business in patent glazing and zinc roofing hitherto carried on by the late Mr. Helliwell will be continued as usual under the style or title of "Helliwell & Co.," by the acting executors, Mr. J. Boosie and Mr. W. Kemp, both

of whom were associated with the late Mr. Helliwell in the conduct of the business for many years.

A NEW CHIMNEY-CLEANER.—Messrs. W. & G. Ashford, of Birmingham, send us the accompanying illustration of a steel scraper which they have patented, for cleaning the insides of flues, drains, &c. As will be seen from the illustration, it consists of a system of jointed steel bars on the head of a rod, which can be adjusted by a screw so as to enlarge or collapse to fit the size of the flue or pipe to be cleaned.



It is claimed that this will not touch, which the ordinary brush

EAST RIDING ANTIQUARIAN SOCIETY.—An inaugural meeting, for the purpose of establishing an East Riding Antiquarian Society, was held on the 19th inst., in the Council Chamber of the Hull Town-hall, Dr. J. Charles Cox, LL.D., F.S.A., presiding.

the provocation of acts of vandalism which might otherwise be perpetrated. The Bishop of Beverley moved.—"That a society be formed, having for its object the study and preservation of antiquities and popularising the archaeology of the East Riding."

PLUMBERS' CLASSES AT NEWCASTLE-ON-TYNE.—Sir John B. Morrison, Town Clerk of London, recently distributed the prizes and certificates of merit granted by the Worshipful Company of Plumbers, London, to the students in the plumbing classes at the Durham College of Science, Newcastle.

CASTLETON SEWAGE SCHEME.—The Chairman of the Castleton Local Board visited London on the 23rd ult., accompanied by the Clerk and the Engineer, to submit to the Local Government Board plans of the proposed sewage scheme for the district.

MEMORIAL TO BISHOP LIGHTFOOT, DURHAM.—On the 20th inst. the canopy which forms the first part of the memorial to the late Bishop Lightfoot, was unveiled in Durham Cathedral. The memorial is placed on the north side of the choir of the cathedral, under the screen dividing the choir from the north aisle.

of Durham, Lightfoot, and Durham and... impaled. The marble cornice has, in... led into it an inscription. Above the... is laid the effigy, in white marble, of the late... who is represented in the episcopal robes... and folded over the breast, the feet resting... three hooks. The model for the effigy was... by the late Sir Edgar Boehm, Bart., and was... completed at the time of his sudden death... which the work was taken up by Mr. Alfred... A.R.A. The altar tomb has been made by... Farmer & Brindley, of London, from the... of the Cathedral architect, Mr. C. Hodgson... P.S.A.

CAPITAL AND LABOUR.

UNITED BUILDERS' LABOURERS' UNION.—Mr. Penvenson, the General Secretary of this Union, issued a circular to builders, &c., in the London... reminding them that the new work was... in consequence of my agents, to be by conference between... water builders and the representatives of the... come into force in the first week in Novem... The principal rules are as follow:—1. That... working hours in summer shall be 50 per week... during fourteen weeks of winter, comm... on the first Monday in November, first three... 8 1/2 hours per day; eight middle weeks, 8 1/2 hours... per day; three following weeks, 8 1/2 hours... commencing work at 7 a.m., terminating at... 12 noon Saturdays, first three and... three weeks; eight middle weeks 7 a.m. to... 3. That the present rate of wages for... masons shall be advanced 1/4d. per hour. 4. That... employers shall give one hour's notice or pay one... time on terminating an engagement; all... shall be paid at the expiration of such... walking time to be allowed if sent to yard... that the term London District shall mean... miles radius from Charing Cross. The... rates are—ordinary labourers, 6d. per hour;... masons and joiners, 8 1/2d., bishermen, 7d.;... and rates will be 6 1/2d., 7d., and 7 1/2d. per hour respect...

Hons of cylinders, or portions of a frustrum of a cone, or the plates are formed of other materials, and unite the same by means of flanges, or otherwise, so as to... into a central flow is thrown downwards and... suitably mounted above the stove they form a series of... louver, permitting cold air to freely enter and ascend, and also permitting rays of light to be visible between... the flanges, which are closed in a downward direction... and upwards. At the same time air is warmed and... carried upwards through the stove.

18,504.—DRAINAGE: M. Nadwin and Others.—This... invention relates to a certain apparatus for the treatment... of fecal and sewage matter, and enables waste on... sewage matter, such as the solid and liquid matter... from water-closets and urinals, as well as the water... from sinks, laundries, bath-rooms, and the like to be... received in a common pipe, which conducts them to an... apparatus fully described in the specification, where... the solid matter, being automatically separated from... the liquid matter, is distinguished or treated for the... manufacture of manure.

6,047.—HINGES: A. G. Brookes.—This invention has... for its object to construct a three-part hinge adapted... for tripods and analogous cases, or in instances where it... is desired to connect three parts together, and to provide... for the independent movement of each. A puntle is... provided, which revolves upon it in any usual manner... leaving the three parts freely revolvable on the puntle... and another puntle is provided, which may be con... nected with the first-named puntle rigidly if desired, and... if not, the puntles may be formed in a single piece... The last-named puntle is adapted to receive upon it the... third leaf, which is also freely revolvable. The last-named... puntle is so arranged with relation to the first... puntle that the leaves thereon may be turned on an axis... right angles to the axis of the first-named puntle... and may also be turned on the axis of the first-named... puntle as desired.

8,940.—WINDOWS: G. Meager.—This specification... describes improvements in the construction of sashes... and frames to facilitate the closing of the windows... without incurring the risk of sitting or standing outside... on the sill. The sashes are hung with hinges of slip... of hard wood. These slips are hung with pulleys and... lines in the usual way, and secured to the sashes and... frame with heads, which are grooved and lugged into... the stiles of the sashes, thus preventing the sashes from... shifting out of place, and thereby can be opened into... the room as an ordinary casement window. At the... same time the sashes can be run up and down as... ordinary running sashes. The sashes can be fitted... with folding as a pair of casements, or in one casement... and when closed to show as casements or as double... hung sashes. They can also be hung to the slips with... three-leaved butt, so as to open either inside or out...

NEW APPLICATIONS FOR LETTERS PATENT.

October 10.—18,012, C. Coe, Water Taps.—18,042, J. Peebles, Self-locking Window-sash Fastener.—18,044, H. Haynes, Handle Catch for Casework Doors, Cupboard Doors, &c.—18,045, J. Parker, Manufacturing Machinery, &c.—18,048, J. Parker, Manufacture of Rofers from Metal, Stone, Slate, &c.—18,057, J. Ryder, Machinery for Preparing Clay in the Manufacture of Bricks. October 11.—18,114, T. Coulthart, Jun., and R. Cottam, Door-locks having a Combined Night Latch and Bolt.—18,119, S. Salzberger and J. Reibald, Benthines.—18,145, T. Jones, Plaster for Building Purposes.—18,178, J. and W. W. Adams and H. Wallace, Decorating Tiles.—18,180, H. Piron, Ventilating Stoves. October 12.—18,234, J. Drummond, Embossing Wooden Panels.—18,255, W. Crow and S. Lehmann, Gaskets and Drains.—18,269, N. Donovan and T. Myers, Setting Circular Band, and Hand Saws. October 13.—18,298, M. Adams, Water-closets.—18,302, P. Hoole and F. Bruce, Stoves, Ranges, and other Fire-places.—18,303, J. Morry, Window-sash Fastener.—18,340, H. Staudage and C. Smith, Pigments.—18,348, T. Curberst, Wood Flooring and Pavements. October 14.—18,447, S. Payne, Sash-fasteners.—18,454, J. S. Chubb, Coal or Fuel Sash Ventilator.—18,455, J. Sears, Roof Ventilating.—18,456, J. Sears, Increasing Draught to Fireplaces and Ventilating Rooms. October 15.—18,477, J. Clark, Flushing Apparatus by Compressed Air for Water-closets, &c.—18,485, B. Phillips, Drain-pipes and Drainage Appliances.

PROVISIONAL SPECIFICATIONS ACCEPTED.

14,218, W. Dick, Gas-pipes.—16,473, J. Keal, Flushing Out Water-closets flushed with Waste-water.—16,619, Yates, Haywood, & Co., and the Rotherham Foundry Company, Limited, and Robert Henry, Adjustable Fire-grates.—16,653, L. Atherton, Siphon Gaskets.—16,703, W. McNelly, A combined Knife and Square.—16,717, J. Bloomfield, Plaster.—16,755, J. Bishop, Ventilating of Dwelling-houses and other Buildings, &c.—16,850, A. Mears, Planing or Shooting Mitres.—16,975, C. Robertson, Sash-fasteners.—16,999, C. Harrison, Preventing the Bursting of Water-pipes by freezing.—17,046, C. Manchip and R. Foley, Roofing-lies.—17,074, G. Law, Kersch-planer.—17,154, W. Facey, Hydraulic-jacks.—17,177, T. Sanford, Hinges.—18,254, A. & H. Brentnall, Telling-work and other wire or light iron-work.—12,371, R. Bell, Heating, Ventilating, and Cooling Apartments, Buildings, &c.—17,384, L. Culman, Sash-fasteners.—17,355, T. Edgeworth, Wood-paving Blocks.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.) 21,613, P. Walker, Ventilators.—22,036, W. Tucker, Anti-drip Sash-bar.—23,610, A. Gill and W. Gill, Paints and Lacquers.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 17.—By Henry & Latchford, 1 & 2 Bedford Nursery, Clapham, L. 620.—By E. Wood, 1 Keston Cottages, Fulham, rd., Leytonstone, L. 374, 1st, 350s., 47 and 49, Park-rd., Manor Pk., l. 400s., 25, Colveston-cres., Dalston, N. 64, r. 7, l. 452, 400s.; 210, Portland-rd., Norwood, u.t. 77, r. 4, G. 61, 200s.; two plots of building land, Hoxton-rd., Stratford, S. 80, 100s. OCTOBER 18.—By Debenham, Tewson, & Co., 1 to 7, Earl's Pk.-ter., Tooting, l. r. 200s., 1,815s.; 139, 141, and 143, Camberwell-grove, Camberwell, u.t. 74 yrs.,

g.t. 247, r. 116s., 850s.—By Dunssett & Co.: 236, 238, and 240, Dartford-rd., Dartford, l. 660s.—By Wells & Reed, 40, Daleview-rd., Stamford-hill, u.t. 75 yrs., g.t. 52, 30s., 165s.—By Dudley, Son, & Vine, 110, Walmley-rd., Notting-hill, u.t. 40 yrs., g.t. 84, 300s.

OCTOBER 19.—By Osborn & Mercer: "Hill House" and 6 1/2 acres, Brunton, North, l. 1,470s.—By W. J. Wood, 13 and 14, Gunning-st., Finsbury, u.t. 63 yrs., g.t. 54, 10s., 430s.; 456 and 458, Woolwich-rd., Charlton, u.t. 48 yrs., g.t. 47, 7s., r. 66s., 4s., 400s.; 4 to 4, Ivy-st., Lewisham, u.t. 75 yrs., g.t. 20s., r. 132s., 12s., 470s.; 3, Stockwell-st., Greenwich, l. 40, 620s.; 1, g.t. r. of 22, Burney-st., with reversion in 33 yrs., 560s.; 26, Burney-st., l. r. 30s., 500s.; 23, Wood-st., u.t. 40 yrs., g.t. 30, r. 10s., 10s., 125s.; 29, Walnut-tree-rd., l. r. 19s., 10s., 200s.; 18, Walnut-tree-rd., l. r. 43s.; 1, Station-villas, u.t. 78 yrs., g.t. 61, r. 36s., 425s.—By Turner, Ridge, & Co.: "Mark Beech Farm," Hever, Kent, 39s., 2s., 3p., l. 1,400s.; "Hilpe Cottages," l. r. 11s., 1s., 15s.; 1, g.t. of 10, with reversion in 61 yrs., 220s.; 1, g.t. of 12, ditto in 63 yrs., 30s.—By P. Young, L.g.r. of 29, Eastcott-st., &c., Stockwell, and Nos. 5, 7, 9, and 11, Crossford-st., u.t. 9 yrs., g.t. 22s., 12s., 9d., 175s.; 4, Lansdowne-gardens, u.t. 69 yrs., g.t. 3, r. 36s., 335s.; 8 and 10, Lansdowne-gardens, u.t. 69 yrs., g.t. 12s., r. 7s., 25s.; 15, Sibella-rd., Clapham, u.t. 75 yrs., g.t. 10s., r. 50s., 480s.; 37 and 39, Hill-drops-cres., Holloway, u.t. 56 yrs., g.t. 16s., 900s.—By Jones & Son: 1 to 10 (odd), Florence-rd., and 41, Redcliffe-rd., Upper Pk., u.t. 23 yrs., g.t. 43s., 430s.—By W. N. Woodhouse, The residence, "Ivy Lodge," Windsor, Berks, l. 1,000s.; "Kirkdale," Lansdowne-hill, Norwood, u.t. 90 yrs., g.t. 14s., 6d., 375s.

OCTOBER 20.—By T. G. Wharton: Nos. 308 and 310, Gray's Inn-rd., and 72, Acton-st., l. r. 95s., 7,500s.—By F. J. Bixley & Sons: 11 and 13, Cornbury-rd., Rotherhithe, u.t. 84 yrs., g.t. 10s., r. 52s., 310s., 17 to 21, 23 yrs., u.t. 84 yrs., g.t. 84, r. 10s., r. 104s., 600s.; 34, Trantor-rd., Bermondsey, and 35 to 41 (odd), Keaton-rd., u.t. 52 yrs., g.t. 12s., r. 157s., 6s., 1,500s.; 43 to 49 (odd), Keaton-rd., u.t. 62 yrs., g.t. 12s., r. 11s., 14s., 1,100s.; 19 to 23, Martin-st., u.t. 38 yrs., g.t. 1,200s.—By Newson & Co.: 15, Highbury-grove, Highbury, l. 2,000s.; 54, Prince of Wales-rd., Kenning-town, u.t. 48 yrs., g.t. 5s., 2s., r. 61s., 2s., 400s.; 25, Parish-st., Hoxley-down, l. r. 32s., 2s., 300s.; "The Limes," with stabling, Totteridge, Herts, l. r. 52s., 10s., 805s., 94, Granville-rd., Kilburn, u.t. 88 yrs., g.t. 8s., 8s., 200s.; 3 to 8, Sun-row, Islington, u.t. 38 yrs., g.t. 20s., 15s., 535s., 54, Prince of Wales-rd., Kenning-town, u.t. 38 yrs., g.t. 5s., 5s., 400s.—By Stokes & Pinder: 420, Edgware-rd., and Nos. 123 and 125, Princess-st., u.t. 29 yrs., g.t. 40s., 1,010s.; 1 to 49, Christ Church Residences, Marylebone, u.t. 64 yrs., g.t. 60s., 4,015s.; 2 to 7, North Wharf-rd., Farringdon, u.t. 29 yrs., g.t. 11s., 1,155s.—By H. J. Bliss & Sons: 32, Groombridge-rd., Hackney, u.t. 70 yrs., g.t. 6s., 8s., 300s.; 4 to 7, Mimco-pk., Edgware-green, u.t. 27 yrs., g.t. 16s., 200s.; 1 to 6 and 1 to 15, Tuscan-st., and 11 to 14, Bonwell-st., with a g.t. of 30s., 10s., u.t. 56 yrs., g.t. 60s., 2,610s.; 1, g.t. of 30s., 600s.—Mile End, u.t. 24 yrs., g.t. 6s., 200s.; 37 and 39, Heald-rd., u.t. 31 yrs., g.t. 3s., 12s., 6d., 400s., 600s.—By Boyton & Peppin: 6, Melmoth-pk., Fulham, l. 600s.; 47, Barclay-rd., u.t. 75 yrs., g.t. 5s., 440s.

OCTOBER 21.—By T. W. Woodcock: "The Holywood House," Windmill-hill, Hampstead, and cottage, l. 2,100s.—By Jones, Lang, & Co.: 46, Lamont-rd., Chelsea, u.t. 73 yrs., g.t. 3s., 5s., r. 40s., 500s.; 13, St. Ann's-rd., Kings-hill, u.t. 58 yrs., g.t. 2s., 40s., 4s., 225s.; 7, Pentonville-rd., Islington, u.t. 24 yrs., g.t. 5s., 420s.; 1, g.t. 13s., 13s., Georges-rd., Holloway, reversion in 24 yrs., 440s.; 1, g.t. of 160s., Christie-rd., Hackney, u.t. 52 yrs., g.t. 2,180s.; 1, g.t. of 30s., 3s., Annis-rd., u.t. 52 yrs., g.t. 25s.; 1, g.t. of 20s., Casland-rd., u.t. 52 yrs., 470s.; 1, g.t. of 16s., Victoria-pk., u.t. 52 yrs., 310s.; 1, g.t. of 84s., Cedar-rd., Fulham, u.t. 58 yrs., 1,465s.

(Contractions used in these lists.—R.g. for freehold ground-rent; l.g. for leasehold ground-rent; l.g.r. for improved ground-rent; g. for ground-rent; r. for freehold; c. for copyhold; l. for leasehold; t. for estimated rental; n.t. for unexpired term; p. for per annum; y. for years; st. for street; rd. for road; sq. for square; pl. for plots; t. for terrace; cres. for crescent; yd. for yard, &c.)

PRICES CURRENT OF MATERIALS.

Table with columns for Timber, Mtyale, and Oils, listing various materials and their prices.

MEETINGS.

TUESDAY, NOVEMBER 1. British Museum.—Miss Emily Penrose on "Greek in the British Museum: Signed vases." III. 9 p.m. Royal Institute (Lectures for Sanitary Officers).—F. De Courcy Meade on "Scavenging: Disposal of..." 8 p.m. City of Biblical Archaeology.—8 p.m. Anti-Cancer Association.—Mr. Wilson on "Glasgow Cathedral." 8 p.m.

WEDNESDAY, NOVEMBER 2. Royal Archaeological Institute.—Three papers will be read. Alders' Foremen and Clerks of Works Institution.—Monthly meeting. 8.30 p.m.

FRIDAY, NOVEMBER 4. Architectural Association.—Mr. W. Young on "The Education of an Architectural Engineer." 7.30 p.m. Royal Institute (Lectures for Sanitary Officers).—Professor A. Wynter Blyth on "Diseases of Animals in Relation to Man's Supply; Characteristics of Vegetables, &c., unfit for Food." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS. 655.—SAWS: W. W. Horn.—This invention relates to improved saw-setting and filing device, and consists of an apparatus having adjustable jaws for holding and guiding the saw, hinged adjustable guides projecting above the saw and slides mounted in the said guides, the slides carrying files on other sharpening the slides are caused to reciprocate in a horizontal plane by means of connecting rods attached to the driving shaft of the machine. The files are pressed down by springs during their forward motion, and raised by a suitable cam as the slides slide, and are adjusted by means of screws to regulate the position of the files to the teeth of the saw. After the filing of the teeth of the saw is advanced by arrangement of a pawl, crank arms, and cam mechanism, the space of a single tooth, so that the teeth of the saw are filed in the heat stroke of the teeth, so that the setting of the teeth and the filing are simultaneous, the saw being released from the press between the teeth of the saw. The setting pins are adapted to engage the teeth of the saw when they file opposite to the pins. The setting-pins are arranged by an arrangement of levers, strokes of the levers, so that the setting of the teeth and the filing are simultaneous, the saw being released from the press at the same time.

715.—STOVES: P. Lomas and H. E. Lomas.—This invention is an improved form of stove, and consists of a gas, fire, or other burner capable of being regulated in its usual manner. Above and surrounding this burner is fixed a series of polygonal flues, formed of sheet metal, or other suitable material. Each of the flues may be formed of one piece or more fixed together, and circular, elliptical, or otherwise in plan. Inventors, one sheet metal, copper, tin, or other plates, and shear, press, stamp, and corrugate plates, so as to approximate to the form of por-

TENDERS.

[Communications for insertion under this heading should be addressed to 'The Editor,' and must reach us not later than 12 noon on Thursdays.]

BANSTEAD.—For the erection of two blocks of four cottages each at Burch Heath, Banstead, for Mr. Chas. Beall, Mr. F. J. Dibble, architect, Dorking. £1,328 14 0

BIRKENHEAD.—For alterations and additions to music-hall, Mr. T. T. Rees, architect, 22, Haulston-street, Park-Head. £1,206 6 6

BLAIRGOWRIE, N. B.—For the extension of sewage works, &c., for the Police Commissioners, Mr. Luke Falconer, Burgh Surveyor, 7, George-street, Blairgowrie, quantities by Surveyor:—

Contract No. 1.—Excavations, Supplying and Laying Pipes, &c. Hutchison & Macdonald, 2,051 7 1 1/2; R. Taylor, 4,841 16 8; John Melly, 354 2 0; Mitchell & Bond, 484 7 6; James Bruce, 485 0 0; William Low, 473 15 6; William Hoyle, 460 12 6; James Macdonald, 473 6 6; Geo. Mackay & Son, 450 1 8; Bain & Co., Dundee, 405 11 0. * Accepted.

BURTON-ON-TRENT.—For the laying of about 630 lineal yards of pipe-sewer, Barton-under-Needwood, for the Rural Sanitary Authorities, Mr. George Watson, surveyor, 28, Devereux-street, Burton-on-Trent. Quantities supplied by the surveyor:— Tomlinson, 225 0 0; G. S. G. & Co., Burton-under-Marsh, 193 9 3; Needwood, 4,179 19 0; Law, 182 10 11. * Accepted. [Surveyor's estimate, £182, 10s.]

CARDIFF.—For the erection of infectious Diseases Hospital, Canton, Cardiff, for the Cardiff Corporation, Mr. W. A. Hanson, Borough Engineer, architect:— J. D. Davies, 29,549; C. J. Dunn, 27,721; J. St. John, 29,177; H. Davies, 26,870; Laidy & Co., 25,282; E. Turner & Co., Cardiff, 23,808; J. Allan, 23,188. * Accepted.

CRAYDON.—For the erection of stables and additions to house, Aldenham-road, East Craydon, for Mr. Alderman Layton, J. G. Frisch, architect. Quantities by Mr. Arthur Keen:— S. Page, 474 8 1/2; J. C. G. & Co., 459 4 0; Bull & Co., 306 0 1; M. Taylor, (patent), 588 0 0. * Accepted.

EASTBOURNE.—Accepted for the erection of patented refuse destructor cell, Mr. C. Tomes, Borough Surveyor, Town-hall, Eastbourne. Messrs. Allott & Co., Nottingham, 2,293 0 0

EDMONTON.—For the construction of first portion of roads and sewers, Breckinridge Estate, for the Edmonstone Freehold Land and Building Society, Limited, Mr. Henry W. Dobb, Surveyor, 110, Leith-wall, E.C. 2:— W. H. Wheeler, 4,855 10; T. P. Adams, 4,359 0; Pary, 645 0; M. S. R. McEwan, 383 0; John Beave, 473 0; W. Nicholls, 334 17; James Fennell, 413 0; John Jackson, 320 0; A. T. Caley, 396 0; William Davey, 340 0; James Roundhill, 398 0; H. Dray, 574 0; Geo. Bell, 378 0. Surveyor's estimate, £400.

ENFIELD.—For the construction of a 24-in. pipe main sewer, Fender's End, for the Local Board, Mr. W. Kite-Inglish, Surveyor, Little Park, Enfield:— H. W. Adams, 4,450 0; Adams, 2,285 0; Caley, 329 0; Bell, 318 0; Jackson, Enfield, 223 12; Patey, 287 0. * Accepted.

HERTFORD.—For rebuilding All Saints' Church, Hertford, Messrs. Paley, Austin, & Paley, architects, Lancaster. Quantities by Mr. William Wright:— Lo Squire & Co., £32,124; Paters, 6,222,400; Andrews & Sons, 33,688; Dove Bros., 22,085; Thompson & Son, 22,408; Halliday & Co., 23,964; Hill Roe & Son, 33,801; H. Norris, 21,392; Weston & Son, 22,774; Thomas & Son, 21,218; Witcock & Co., 22,721; Rudd & Son, 19,284; Ford, 22,473; Smith & Sons, 23,292; J. A. Hunt, 22,483; Smith Bros. (accepts), 19,473.

LONDON.—For the rebuilding of the police station at Parkham, for the Receiver for the Metropolitan Police District, Mr. John Butler, Architect. Quantities by Mr. W. H. Thacker:—

Table with columns: Item, Allowance for 10d Material, Amount of Tenders. Items include Hart, W. Abbott, Ansell, Higgs & Hill, Holloway, Lawrence, Grever, Smith, Lathley, Perry, Brass, Gwney.

LONDON.—For enlarging the Garratt-lane School, Duntlith, Wandsworth, by 84 places, and for other work, for the School Board for London, Mr. T. J. Bailey, Architect:—

Table with columns: Name, Amount. Items include D. Charteris, J. Burnand, Mowlem & Co., Hart Bros., W. Down, J. Tyerman, Holloway Bros., Holliday & Greenwood, Treasure & Son, Harrin.

LONDON.—For alterations and additions to No. 111, Bond-street, for Messrs. Ross & Co., Mr. A. M. Rice, architect:— Hywaters, £2,161 0; Wetherill, Lee, & Martin, £1,659 10; Cooper, 2,263 0; Jones & Richards, 1,346 0.

LONDON.—For alterations and additions to the laundry buildings at the Poplar Union Workhouse, for the Guardians, Mr. John Clatton, surveyor, 146, High-street, Poplar, E. C. 2:— Shorburn, £3,879; Holland, £5,986; Harris & Wardrop, £2,328; Phillips, £5,639; Hunt, 6,243.

LONDON.—For alterations at the 'York and Albany' public-house, Gloucester-gate, Ross & Pail, N. W. W., for Mr. J. Holroyd, Messrs. Saville & Martin, architects, Dacre House, Arundel-street, Strand, W. C. 2:— Yadley & Son, £1,229; Martin, Wells, & Co., £1,148; J. Alder & Son, 1,238; Gould & Brand (accepts), 1,118.

T. Heath, Designer's Work, £153 0; Saunders & Sons, £85 0; J. Edwards, 103 15; Wats & Co. (accepts), 84 0.

Vanhan & Brown, Designer's Work, £211 10; J. Biggs, £138 0; W. Wynn, 191 1/2; E. Fraggell (accepts), £20 0.

LONDON.—For converting the old laundry at the infirmary, Bains-street, Old Gravel-lane, E. C. 2, for the Guardians of the Parish of St. George-in-the-East, Messrs. Wilson, Son, & Aldwinckle, architects, 1, Victoria-street, S. W. Quantities supplied:— C. L. Cole, £290 7 0; J. B. Hunt, 478 0 0; J. Victor, 654 0 0; W. Lawrence, 463 0 0; G. Barker, 559 0 0; J. Holland, 452 0 0; T. White & Son, 494 0 0; W. H. Lenden & Son, 439 0 0; G. E. Todd, 491 0 0; Wall & Co., 439 0 0; Norris & Lake, 488 0 0. * Accepted.

LONDON.—Accepted for the erection of a block of shops, Church-road, Upper Norwood, E. C. 16, for the Guardians of the Parish of St. Mark, Craydon, 25,043 0 0. [No competition.]

LONDON.—For erecting additional workshops and showroom at Brompton, for Mr. H. Pickett, Messrs. Saltar, Issett, & Saltar, architects, 18, Thornicroft-street, St. Pancras, N. W. 2:— H. Davaull, 4,779 0; C. A. Ellis, 4,370 0; A. Saltar, 397.

LONDON.—For work at 119, Clarendon-terrace, Bayswater, W., for Mr. F. Riddell, Mr. F. Le Rossignol, architect, & a surveyor, J. Graham Buildings, B. High-street, E. C. 2:—

Sanitary and Construction Alterations. J. Langham, £285 0; F. Poxley & Co., £160 16; Bejuman & Robinson, 192 4; McMillan & Houghton, 141 0; Hot Water. J. Wouter Smith, Gray, & Co. (accepts), 293.

LONDON.—Accepted for alterations at the Parish-street Work-house, Bermondsey, Messrs. Newman & Newman, architects:— Maxwell Bros., limited, £158 0 0.

PLYMOUTH.—Accepted for the erection of stables, coach-house, &c., at Woodland-terrace, for Mr. Geo. Brown, Mr. Jas. Harvey, architect, Bedford Chambers, Plymouth:— Pearn & Sons (Plymouth), £200 0 0.

PORTSMOUTH.—Accepted for the erection of part of a nave of the new church of Corpus Christi, Portsmouth, for the Right Rev. John Virnie, Bishop of Portsmouth, Mr. W. Linn, architect, Great Malveria:— Messrs. W. K. & C. Light, Portsmouth, 41,447 0 0.

SNODLAND (Kent).—For the erection of the 'Eustace Hook Memorial' villa, Snodland, Wagborough-road, Snodland, Kent, for Miss M. M. Hook, Mr. Geo. B. Cobham, architect, 1, and S. Edwinstreet, Gravesend:— Black & Sons, £1,324 0 0; Dover, Hodges, & Co., £1,048 17 0; Harry Seaver, 1,209 18 6; R. Avaral, 1,013 0 0; W. Laidlaw, 1,129 0 0; C. J. Royle, 1,000 0 0; G. M. Deing, 1,097 0 0; E. G. Brown, 960 0 0; W. H. H. & Co., 1,089 0 0; W. F. Gose, 944 18 4; W. H. Archer, 1,053 0 0; J. Willson, Snodland, 840 0 0. * Accepted.

SUTTON (Surrey).—For the erection of a cottage, &c., at the Seage Works, for Mr. E. W. Critchley, Surveyor, Local Board Offices, Sutton, Surrey:— Geo. Wade, 4,209; Walter Lawrence, 4,275; Hy. Adams, 4,209; A. H. Harris, Blackwater, Wm. Akers & Co., 485; Sutton, Surrey, 315; J. S. Humphreys, 480. * Accepted.

SUTTON (Surrey).—For the erection of four shops and dwellings, Town-hall, Tonquay, South Devon:— Burrow, architect, Sutton, Quantities not supplied:— H. Adams, £2,049; Baldwin & Longland, Mr. E. G. J. B. Peter, 2,569; W. F. Wyatt, 2,723; G. Bourne, 2,573; J. Stone, 2,710; A. H. Harris, 2,679. * Accepted.

TORQUAY.—For the construction of a brick sewer, manholes, &c., Market-street, for the Local Board, Mr. H. A. Garrett, Engineer, Town-hall, Torquay, South Devon:— W. C. Cha. Hook, £241 0 0; G. Green, 2700 0 0; Cookman & Son, 808 0 0; W. Stebbins, Ellis, Cookman & Son, 808 10 0; W. F. Gose, 614 4 2; J. Shaddock, 781 1 0. * Accepted. [Engineer's estimate, £246, 6s. 2d.]

WINCHMORE HILL.—Accepted for the execution of sanitary and drainage works at the Northern Hospital, Winchmore Hill, for the Metropolitan Asylum Board, Messrs. Pennington & Bridgen, architects:— H. Wall & Co., Carlton Works, Kenilworth Town, £1,315 0 0.

WINCHMORE HILL.—Accepted for carrying out surface drainage work to temporary pits at the Northern Hospital, Messrs. Pennington & Bridgen, architects:— H. Wall & Co., Carlton Works, Kenilworth Town, £108 12 6.

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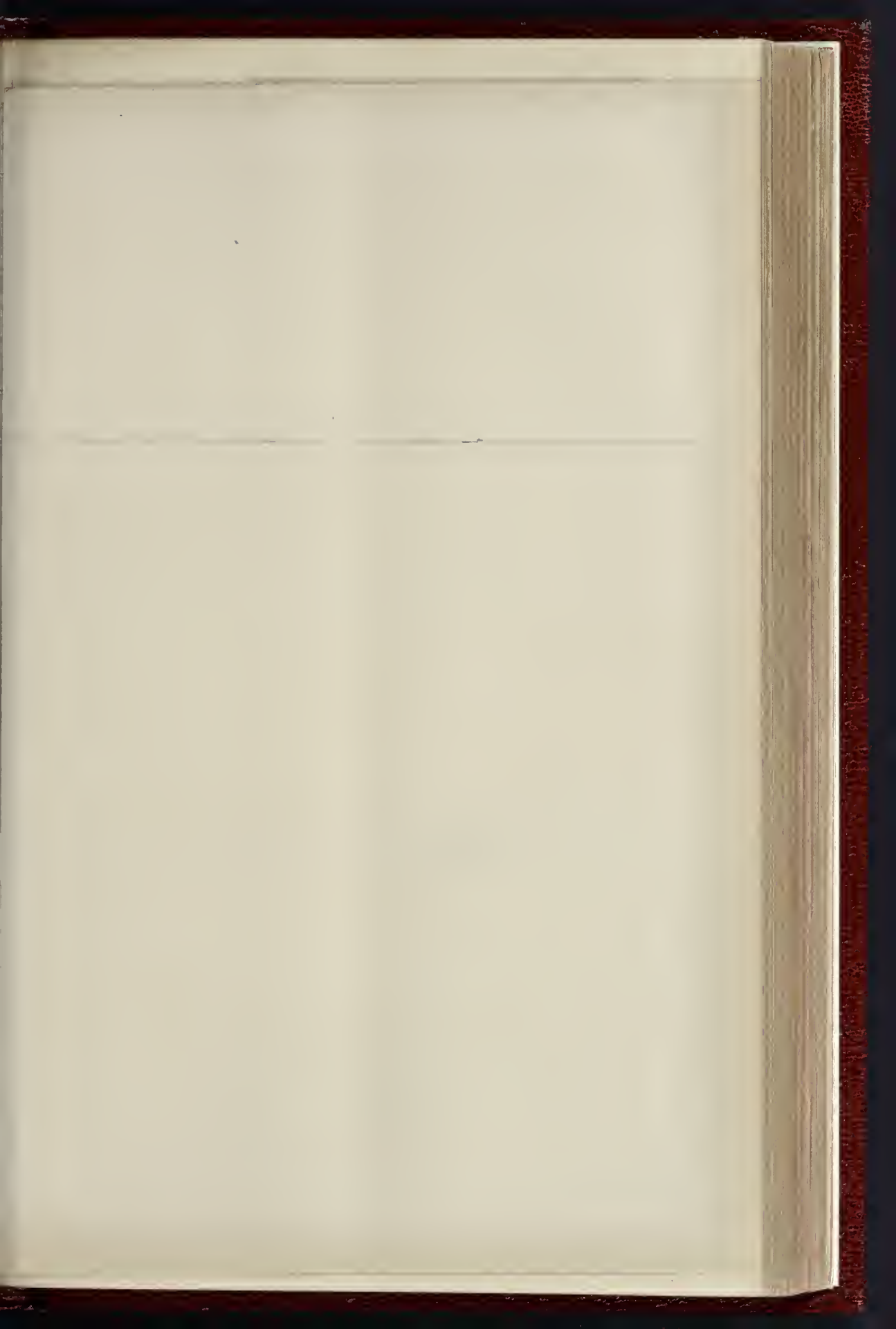
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FROM THE SOUTH-WEST, AS IT WILL APPEAR WHEN COMPLETED. MR. J. L. PEARSON, R.A., F.R.I.B.A., ARCHITECT.

The Builder.

Vol. LXIII. No. 2595.

NOVEMBER 7, 1892.

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Bloomsbury and St. Giles-in-the-Fields.



June 13 last year, shortly after the late Duke of Bedford's death, we gave an account, in outline, of a London estate that has formed a heritage of his house since the marriage of Rachael, widow of Francis, Lord Vaughan to William, Viscount Russell. The development from that time can be clearly traced. For earlier events, together with its close association with St. Giles-in-the-Fields, we have hitherto been dependent mainly upon the quarto volume published in 1822 by John Parton, Vestry Clerk of that parish. A new historian claims attention with a hook which we opened in expectation and closed in amazement, so different is it from any recent work of its kind, and calculated to fairly surprise everyone who relies upon the ordinary text-books.*

"I owe much," Mr. Blott writes, "to John Parton's work . . . for by its errors I was led to greater research, and found the chronicle of Blemundsbury underlying the early history of St. Giles-in-the-Fields." He contends that Blemundsbury existed, and, for a while as a royal manor, centuries before there was any parish of St. Giles. He traces its possession by Roger de Bellomonte, or Blemonte, Earl of Mellent and of Leicester, first lord by the Conqueror's favour, and his descendants, to the time of Robert Fitzparnell, second son of William de Leporus, at whose death, *s.p.* in 1204, it passed to the De Spencers, of Beaumont, in Maine, whose name and work are recognised in "Spencer's Dig" and "Blemunde's Ditch," south and north of High Holborn. Meanwhile Queen Matilda founded a leper house or leper hospital, dedicated to St. Giles, whose site is shown in our plan of June 13: it was established, urges Mr. Blott, in Blemundsbury.

Rowlan Dobie deals at length with this matter of locality in his "History of the

* "A Chronicle of Blemundsbury." A Record of St. Giles-in-the-Fields and Bloomsbury, with original maps, drawings, and deeds. By Walter Blott, F.R. Hist. Soc. 1892. Published by the author at "Manningdale," South Norwood.

Un'ed Parishes of St. Giles-in-the-Fields and St. George, Bloomsbury," second edition, 1834. He points out that the parish is not cited in Pope Nicholas IV.'s "Valor" for 1291, which contains the whole archdeaconry of the county; St. Giles and Bilmound are described as sokes, or liberties, in the Nona Rolls, 14 Edward III.; all the charters down to Edward III. speak of the hospital, but are silent as to the parish; and that only five (which he enumerates) of ninety-two recorded grants to the hospital specify the parish; so similarly for two out of ten obits. Again, we read in Newcourt's "Repertorium":—

"I find no Institution to any Church in this parish till after this hospital was suppress'd. . . . The first Institution that I find to this Church, as parochial, and a rectory, was on the 20th of April, 1547."

This upon Sir Wilmund Carew's presentation; the next institution is by Queen Elizabeth, whenceforward the advowson continues in the Crown.

"The Mansion-house or Bury of Blemund, was built in nearly the centre of the estate, on a piece of ground lying between what is now the Church of St. Giles-in-the-Fields on the east, and Charing Cross-road on the west. . . . The main western highway ran by it on the north side, and a few straggling huts, or cottages, on the roadside opposite nestled under the shadow of the building. . . . The name of Aude Wyche brings before the reader a Saxon village that was there long before the village of 'Sai Egidij' (St. Giles), for there is no mention of the village of St. Giles in the Domesday Book. . . . A reference to AGGAS [Agas] clearly shows that Hog-lane was not an ancient thoroughfare, but was probably made a "way" about the time of Richard III. An ancient road existed on the east side, called Elde Strate, or Aude Strate, and, with certain alterations, is still a way, and now bears the name of Shaftesbury-avenue. . . . Lord Blemund, who seems to have been a leper, moved the King and Queen to assist him in providing an asylum for those suffering from the terrible disease of leprosy. . . . He allowed a leper hospital to be built . . . between his mansion and the church, which stood at the corner of Elde Strate. Near the church a building had been erected in Elde Strate, known as Le Cloche Hose."

So Mr. Blott places Eld-street along Monmouth (since Dudley) street; whilst the Bell House appears to coincide with the Cloche Hose inn, marked with a hanging sign, by Parton. It was owned, in 1272, by Herbert

de Redemere, or Radvers, the hospital cook; and since he was a Templar and a Crusader, says Mr. Blott, the sign became corrupted "to the 'Crossed Hose,' or crossed stockings on the crossed legs of Crusaders." He believes, then, that crossed legs indicate a Crusader. Manor-house, its site latterly marked by Denmark-place and Lloyd's-court, adjoined the White House,—so called, "probably from its being faced with the old stone which was once part of the Manor-house,"—which Alicia, Lady Dudley, alienated as a rectory, and was rebuilt by her husband's father, Robert, Earl of Leicester. Before her death here, in 1669, aged ninety, Robert Sidney, who built the house in Leicester-fields, on part of the old Beaumont estate, received the title. Thomas, Lord Wharton, lived for many years in the Manor, or Dudley, House.

In his view of the parish *anno* 1570, Parton names as "Southampton House" the large tenement drawn in, or perhaps added to, Agas's map, north-east of what is taken for the "White Hart" at the corner, north-east, of Drury-lane or Via de Aldewiche (hence Wych-street).* Neglecting his dubious detail as to holdings and allotments, we may safely place Merseclade, or Marshland, south of Colman's-hedge and Longmere, and as contained by the line of Crown-street (Hog-lane, Charing Cross-road), West, Castle, and Neal (King) streets. Next east are Newelond, and the extensive tract of Aldewyche, between High Holborn, Lincoln's Inn-fields, and Kemble (Fortifene-lane, Prince's) and Sardinia (Duke) streets. The three-sided plot between High-street, Great Russell and Dyot streets is the Pitaunce, or Cup of Charity, Croft (16 acres), whose western and southern sides are traversed by Blemund's Diche. Through Aldewyche, and passing about 70 ft. north of Lewkenors-lane (since Macklin-street) on to Whetstone Park flowed "Spencer's Dig." Marshland became known latterly as Cock and Pye-fields, and

* This tenement and the "White Hart" appear in Braun & Hogenberg's bird's-eye view of 1572. No. 191, Drury-lane is the "White Hart." White Hart-yard, the old hostelry site, was cleared away under 47 Geo. III., c. 38, and the lane and High Holborn were widened by 7 and 15 ft., respectively. Mr. Blott considers the old "White Hart" replaced a manor house of the Christmase family, and that John Christmase was "John of good memory," cited in the charter of 1101, priest of the village church. Southampton House, Bloomsbury-square, was built in 1664.

then as Seven-dials, where Neale began to build in 1694. The old "Cock and Pie," which stood at the south-western corner of Castle-street must not be confounded with the notorious "Magpie" or "Cock and Pie" in Drury-lane.

In identifying Blemundsbury with St. Giles-in-the- (Westminster) Fields we may apply Pope's couplet:—

But now (so Anne and piety ordain)
A church collects the saints of Drury-lane.

remembering that St. George's, Bloomsbury, was taken out of St. Giles's under the Act of 1730. Its church, and that of St. Mary-le-Strand, to which Pope alludes, rank amongst the "fifty new churches." St. Giles's parish is L-shaped, having at its corners: Whitefield's Tabernacle, Tottenham-court-road, Seven-dials, Upper St. Martin's-lane, the junction of Castle-street and Drury-lane, Kemble-street, Portsmouth-street, Lincoln's Inn, Hand-court, High Holborn, Dyoct-street (south end), and Torrington-place. The corners of St. George's, Bloomsbury, are the crossing of Hunter and Compton streets, Guildford-street (west end), and Kingsgate-street, High Holborn.

"The first scene is the brow of Holborn Hill. . . William the Norman, by virtue of conquest, is King of England, has taken up his quarters in an abandoned fortress or castle outside the western wall of London, and . . . the ancient fortress on Holborn Hill has changed into Staple Inn."

By Holborn-bars, therefore, we are hidden to fix a castle, standing, says Stow, near the Thames's bank, at the west end of the City, whose "choyce stones" William gave towards the rebuilding of St. Paul's after the fire of 1086. A position near the river bank points rather to Mountfitchett Tower, or the Palatine cited by FitzStephen. Camden says much of St. Paul's was built with the ruins of the Palatine, hurt down in the Conqueror's day. He adds that they took some of the stones for the new Dominican Monastery, but the Black Friars did not migrate hither from High Holborn until nearly 200 years later.

Mr. Blott says that the grounds around Mountfitchette Castle were known as Fitchette-fields, Fiquet-fields, or Thicket-fields, and, lastly, as a portion of that domain, changed its name to Lincoln's Inn and Lincoln's Inn-fields. Bredwell stood by, if not on, the site of Mountfitchett: so he calls us by a somewhat "far cry" to Lincoln's Inn-fields. Of Fiquet-fields the Crace collection contains a valuable plan, finely coloured and inked-in, showing how the ground was occupied just 300 years ago. The plan, to scale of 20 yards to an inch, measures 20 in. by 16 in., and is a copy of one made by J. Long in 1592, bearing Lord Burlington's signature. It shows the positions of Clement's-well, the Grange, the Six Clerks' Office (Hersflete's or Kederminster's Inn), and the house of Mr. Boswell (whence Boswell-court). Mountfitchett's close ally, Geoffrey de Magnaville, Lord of Essex, has his strong hold too—on Holborn-hill crest, separated by Aldewyche from his Eia, or Eye, manor, since Ebury.* His grandson espouses the cause of the Empress Maud, but, captured by Stephen at St. Albans, is forced to forfeit his wide lands. King John reverses the attainder, and the Mandevilles, partially recovering themselves, merge by marriage into the De Lacys, Earls of Lincoln, from whom Lincoln's Inn is called. In a drawing Mr. Blott puts Essex House, Magnaville's fastness, at Staple-inn. Thus, we pass on to a striking chapter of the "Chronicle." A common explanation of the origin of that Inn's name is derived from Sir George Buc, who says it was the inn or hostel of the merchants of the Staple (as the tradition is), wherewith until we can learn better matter we must rest satisfied. The Staplers plied their traffic at the western end of Westminster Bridge, and, it is said, removed to Holborn on the making, temp. Richard II., of New Palace-yard. The author will have none of this. He sees another signification in the

* Castle-street, *præter* Castle-yard, is re-named Furlival-street.

device of the woolpack or woolsack, in a window of the hall there:—

There is a deeper meaning in that small square of painted glass; it points back to the time when Staple Inn was the court of the King's Justiciary, a court higher than the Chancellor's Court, into which in aftertimes it became merged.

He claims for Staple Inn that it had been the official home of the Justiciary, Chief Justice of England, inasmuch as his court (until Henry III.'s charter of February 11, 1224-5) followed the King; and that there in Norman times stood the palace and fortress of the Deputy King, Maurice, Bishop of London, protected by the King's friend, Richard Montfitchette. Rohecia, daughter of Anhrey de Vere, Justiciary temp. Henry I., married Geoffrey Magnaville, first Earl of Essex. At Saffron Walden stood a castle of the Magnavilles, and an abbey founded by the pair; the Magnavilles held Essex House by Holborn-bars. So, putting these links together, Mr. Blott deduces that the young ladies of the house of Magnaville must have enjoyed the pleasant wanderings over the saffron fields of Walden, and, charmed with their verdant beauty, they appear to have reproduced a similar scene on the northern slope [Saffron-hill] of Holborn. In Edward II.'s reign [Walter de Stapleton, Bishop of Exeter, is Custos of the City; to him, we are told, the Inn owes its name, and we are given many instances,—] "remarks that have escaped the shipwreck of time," in Bacon's words,—worthy consideration, to show how the name of Stapleton long survived here and about. Confounding, as it seems to us, the distinct offices of Lord Chancellor, Chief Justiciary, Justiciary, and Justice Itinerant in his roll of Justiciaries at Staple Inn, Mr. Blott goes on to say that it became known as Gray's Inn from Walter de Grey, afterwards Bishop of Chester (or rather Lichfield and Coventry), whom John appointed Justiciary, or Custos, in 1205. But we must remember that the see of Chester had two or three "inns" in London. Nor do we at all follow him in placing Gray's Inn upon the south side of Holborn, and stating that its accepted history is purely fictitious. The Inn's origin is clearly traced from the Lords Gray of Wilton, of whom Reginald de Gray was seised in fee,—see the Inquisition *post mortem*, 1 Edward II., 1308,—at Portpoole, on the north side of the street, of a certain messuage with gardens and a dovecote, thirty acres of arable land, with a certain wind commill, held by service to the Dean and Chapter of St. Paul's. A similar inquisition, 44 Edward III., 1370-1, finds Reginald de Gray of Wilton upon Wee seised of a certain *hospitium* in "Portpoole juxta Holborne," &c.; with one garden, eleven small shops, and three acres of land adjacent, of the Dean and Chapter. Another, 19 Richard II. (1396), establishes that Sir Henry Grey de Wilton had enfeoffed certain parties of his manor of Portpoole, in Holburne, called "Greysyn." Mr. Blott, quoting from an article in our own columns of June 16, 1866, in which the inquisition of 44 Edward III. is cited, though not quite accurately as to its precise terms, says:—

The inquisition referred to was in respect to the claim of Montague, Bishop of Chichester, to the reversion of Lincoln's Inn, at the expiration of a "cancelled" lease then expiring, granted . . . to William Sulyard, 27th Henry VIII., for ninety-nine years, at an annual rent of 6*l.* 13*s.* 4*d.* The fact is that the antiquity of Lincoln's Inn is transferred to Gray's Inn, and the "inquisition" or law suit of 1634 is dated back to 1371.

Not by us, certainly: nor do we see how a Bishop of Chichester's law suit of 1634, as to the reversion of Lincoln's Inn, to which Mr. Blott refers us *passim*, can possibly be mistaken for an inquisition,—quite another thing,—of 1371 on the death of de Grey. He reads the *Builder*: we may remind him that Cummer-place, to which we adverted in a "Note" on August 6 last, was demolished eighty years ago, and that the two old houses, "Cock and Pie," in Drury-lane, were removed two years since (see our "Note" of December 13, 1890). His illustration is a copy

of S. Rawles' plate, published by J. Asperne of Cornhill, on August 1, 1807. We have no space to deal with other matters in this book,—e.g., the Lisle correspondence, Ell House, Clare Market (to which a very early origin is assigned), Tateshall (Tottenham-court), Whetstone Park, Scroop's, Hertsflete's, and Lincoln's Inns, the *Domus Conversorum* (Jews' Justiciary House), &c. A few still passages somewhat hlemish a great deal the excellent, striking, and new. The author's toilsome investigation of records, deeds, with county and family histories, yields a rich harvest, whilst some of his conclusions we not, we think, be at once accepted. It is a pity that in various instances he does not supply more precise references to his sources of information.

Nos. 246-51, High Holborn, belonging to Emmanuel College, Cambridge, represent th Spencer, or Mildmay, estate, and stand on the fore-court of Spencer House. Between Nos. 279-80 is Tichborne-court, its entrance marked, until lately, by an old gabled house bearing a shield of the Tichborne arms.—vain a chief or. Haydu's first home in London was at No. 45, pulled down (1881) for the First Avenue Hotel. Nos. 28-30, north side, modernised in 1852, are supposed to have been built temp. Edward VI. Some plans we have consulted in the Crace collection* show certain properties within this district under review. Bedford School Charity, to which we referred last week, covers parts of Bedford-row, Sandland, Green, Lamb's Conduit, East, and New North streets; Theohald's-row, Hand-court, and Featherstone-buildings; with all Harpur-street; Gower and Upper Gower streets, having Mortimer's estate (Mortimer-market) to the north, are set out for improvement of the Bedford estate, 1800; Alfred-place, with the two crescents, was first leased by the Corporation in 1802. John Dayne's "exact plot and description of certain lands being partees of the Manor of Bloomsbury, &c., 1664-5," sets out Southampton House in the south-east corner, with "Long" (25½ a.), "Baher's" (31½ a.), "Night" (7½ a.), and "Cowles" (4½ a.), "Feilde"; west of "Night Feild" is "City Feild." Thomas Chawner and Sir James Pennethorne's printed plans for Endell-street—over Hanover and Belton streets and Bowl-yard—and for New Oxford-street bear date 1840. Plans for Lord Maynard's property in Maynard and Lawrence streets are dated 1813.

Of the architectural history of any of the more noted buildings in Bloomsbury the author has nothing to say, nor of their architects; which is somewhat disappointing, as any new information about them (if there is any to produce) would have been of interest. We do find the founder of Montague House recorded, with the remark that "it is very possible that had there not have been a Montague House there would not have been a British Museum in Bloomsbury," which is probably true. But the object of the book seems to be wholly topographical and antiquarian. In this respect, though rather dry reading and, as we have intimated, somewhat eccentric in its theories, it contains a good deal of information which should be of interest to land-owners and residents in the now over-huilt (in every sense) territory of Bloomsbury.

THE ENGLISH IRON TRADE.—The English iron market shows little sign of life. Business on all hands being confined to transactions for immediate requirements, buyers clearly anticipating further declines in quotations. Crude iron is only in limited request; but values are practically unchanged. In manufactured iron there is little doing, and prices are depressed. A slightly better tone is reported in the tin-plate branch. Steel continues quiet. In the shipbuilding and engineering departments new orders are badly wanted. The coal trade, so far as household qualities are concerned, is a trifle brisker; but other qualities lack activity. The question of a full week's "play" at Christmas is being mooted.—*Iron.*

* Frederick Crace, the collector, lived, 1807, in No. 65, Great Ouse-street, being the western portion of the house attributed to Inigo Jones. John Crace built Nos. 53-4 in 1779, and lived in No. 54.

THE BUILDING STONES OF MALTA.

IN this country but very little is known concerning the building stones of the Maltese Islands, although samples have, from time to time, been on view at London exhibitions. The great Exhibition of 1851, stone work as the most prominent feature of the exhibits from Malta, and comprised inlaid marble table tops, carved vases, jugs, andelabra, &c. Several of the ornamental vases possessed considerable merit, varying in mind the kind of material in which they were executed, and were illustrated in the Exhibition catalogue.

(Ornamental stone work from Malta also formed a conspicuous part of the exhibit at the late Colonial and Indian Exhibition; the facade outside the Maltese Court, executed in the island under the superintendence of M. Alizia, of the Public Works Department attracted much notice. This facade made on an original design based upon German Renaissance met with at Heidelberg, was not from Malta to London in numbered blocks, and then erected in the Exhibition grounds. But these exhibition specimens, excellent as they were, did not convey a very telligible idea of the building stones themselves, nor of the strata from which they were obtained, and it is to these points that we desire now to call attention.

Geologically, the strata composing the Maltese Islands are of Middle Tertiary (Miocene and Mioene) age. The following table* gives the general succession of the strata:—

Table of Maltese Strata.

Upper coral limestone (300 feet).	a. White coralline limestone.	Gozo marble.
	b. Reddish yellow limestone.	
Green sand (35 ft.).—a. Indurated yellow sand. b. Frable black sand.	c. Soft white limestone.	
Lower limestone (500 feet).	a. White rotten limestone. 1st nodule seam.	
	b. Fine hard-grained limestone. 2nd nodule seam.	
	c. Compact semi-crystalline limestone. 3rd nodule seam.	
	d. Yellowish soft limestone. 4th nodule seam.	
	a. Scudella-bed.	
	b. Hard compact limestone.	

The lower and upper (coralline) limestones are, as a rule, exceedingly compact in texture, and the uppermost beds will take a good polish, as is exemplified by the well-known Gozo marble which is obtained from them. The coralline limestone contains nodules, and is beautifully variegated in certain localities. In addition to marble, these beds yield an excellent building stone, but they are not so extensively used for that purpose, we believe, as the formation known as the *Globigerina* limestone, although being, by some, considered to be superior to the latter in quality.

According to Mr. John H. Cooke, B.Sc., three qualities of building stones are found in the *Globigerina*-limestone formation. The stone of the first quality is somewhat coarse-grained when compared with the others. It is, however, much used for out-door work, as, after exposure to the air, it acquires a hardness and compactness which renders it very durable. The second quality stone, when dry, presents the appearance of being as good as, if not better than, the first quality, but there is a material difference between the two,—a difference that is more easily discernible in wet than in dry weather. During the wet season this stone changes its colour and readily exfoliates, and it is therefore rendered comparatively useless for exterior work. Its brilliant white appearance and other qualities have created a demand for it for interiors. The differences in quality between these two kinds of stone are strikingly demonstrated in the exterior walls of the older houses of Luca and surrounding villages. The third-quality stone is so rotten in character that it

is seldom or never used for constructional purposes.

The greater part of Valletta, Floriana, Sliema, and the churches of Malta and Gozo are, according to Mr. Cooke, built of the better quality limestone of the *Globigerina* division. The special horizon varies in thickness from 25 ft. to 50 ft., following the locality; but it is found that where the bed is thin,—especially at St. Paul's Bay,—the stone is comparatively inferior in quality. The stone derived from the quarries of Tad-Dual and Tal-Gauchi is of a yellowish-white colour, and is accounted amongst the best to be found in the islands, being in constant request for decorative purposes. The same author states that two grave defects militate against its more extended use in high-class architectural work. The first of these is its great variability in colour, and the second is the frequent occurrence of unsightly blotches in the stone, caused by the presence of concretionary nodules of hematite and ironstone. These nodules, when cut through, show ugly markings which disfigure the work in which they occur. Amongst the quarrymen, the markings are known as "suaba" or finger-marks, a name suggested by the form they commonly assume. At Tal-Gandia and Tal-Balal fine-grained, compact varieties of this bed are quarried, and are largely used in the construction of tombstones and monuments. At Inghieret, in the vicinity of the Marsa, and also on the outskirts of Birchcraa inferior stones are obtained.

A considerable quantity of good stone is annually raised in the island of Gozo, especially at Ta-Bardan, in Sannat, where the material is a hard, fine-grained freestone, of a pale yellow colour.

For further information on the subject the reader is referred to the treatise of Dr. J. Murray,* in which the various divisions and the microscopic structure of the rocks are clearly explained; and to various articles in the *Mediterranean Naturalist*, published in Malta.

NOTES.

AS far as present information goes there seems to be little room for doubt that the dreadful railway accident near Thirsk has arisen indirectly from the system of dividing a fast train when it becomes too large to send as one train, and that either some one neglected to inform the signal-man at the Junction that the express was divided, or that he forgot the fact. The event, in that case, is a terrible lesson on the danger of thus introducing an extra loophole for an accident by dividing a fast train at a time of year when such division is not of everyday occurrence. There are two suggestions which may be made for rendering such accidents at all events less possible in the future. One is, that the running of trains in two sections, if unavoidable, should be kept up regularly and as a recognised system during the portion of the year when the fast traffic is heaviest; kept up always during that period, and between certain specified dates, and rigorously excluded at other times. Most reasonable people would surely agree that it is better to be told they must wait for the next regular train than run the risk of a terrible accident through a misunderstanding. The other safeguard which occurs to us is possibly already employed, but if not, it ought to be: it is, to have a distinct and unmistakable extra tail-light or tail-signal at the back of the first section of the train, to show the signalmen that it is a section only, and that the remainder is following. We do not know whether any such signal is adopted, but it is a very important point, and one which ought to be touched upon at the inquest. If there is no such device in use by the railway companies in such cases, they have neglected a

very simple and effectual means of guarding against such a mistake as that which probably led to the Thirsk accident.

THE first meeting of the Institute for the ensuing session is announced for Monday evening, when the President, Mr. Macvicar Anderson, will deliver his opening address, in which some of the topics so much discussed recently will no doubt be alluded to. Those who agree with the policy of the Institute will, we have no doubt, endeavour to be present on this occasion in support of the President.

IN constructing the new Charing Cross-road, the traffic from the west, by Piccadilly and Regent-street going to Charing Cross and the Strand has been overlooked. The cabmen, indeed, endeavour to force their way through the narrow, crooked little street at the south-east corner of Leicester-square, known as Green-street, and the Vestry of St. Martin's-in-the-Fields is making some intermittent efforts to widen and straighten this street, but the most direct and easy route for the western traffic would be along the top of Leicester-square and through what is now a narrow, tumble-down street, called Bear-street, at the north-east corner of the square. If this street were widened, and the angle where it enters Charing Cross-road rounded off, not only the through traffic from west to east would be benefited, but the local traffic to the numerous theatres in the neighbourhood would be relieved. A new theatre is being constructed at the north-east angle of the square, which must impede the traffic through Cranbourne-street, and there are, close by, a large Parcel Post Office, and the Empire and Alhambra theatres. The completion of the new Portrait Gallery will necessitate some alterations in the streets near it, but it is not desirable that it should be such as to encourage carriage traffic all round it; and if public meetings are to be frequently held in Trafalgar-square the route by Waterloo-place and the Haymarket to Charing Cross station and the City will be obstructed. By opening a route through Bear-street from the top of Leicester-square to Charing Cross-road the distance to the Strand by King William-street and to the station will be shortened, and the gradients will be easier than by the existing routes by Waterloo-place and the Haymarket. A glance at the map of the district shows what an admirable and necessary improvement the widening of Bear-street would be, and the present moment for making it is favourable, as some of the houses at the Leicester-square end of the street are being rebuilt, and the property on the south side of the street is in a very bad condition. Some day when the Government is sufficiently alive to the danger which the National Gallery and its collection of pictures runs from fire from the barracks and houses standing against it on the west side, a street will have to be run down from the west of Leicester-square to Pall Mall and Trafalgar-square to isolate the building, and such a street would still further relieve the north-western traffic bound to Northumberland-avenue and the Embankment and Whitehall, and the present route by Green-street further relieved of the block which at present exists. This, however, is not so urgent a street improvement as the widening of Bear-street, and must not be allowed to divert attention from it.

ON Tuesday the historical castle church of Wittenberg, which has lately been restored, was re-consecrated with much ceremony. Wittenberg Castle, to which the church belongs, was known as far back as 1179, but the presence of a place of worship within its walls can only be traced back to 1306. In 1353 this place of worship is known to have been a consecrated chapel, and after a period of re-construction, dating 1493 to 1499, it is spoken of as the Wittenberg Castle Church. In 1499 the Castle Church was consecrated as such by a Papal Nuncio, and

* Gregory. Transactions of the Royal Society of Edinburgh, vol. xxvii. (1891), p. 631.
† *Mediterranean Naturalist* (1892), p. 152.

* "The Maltese Islands, with Special Reference to their Geological Structure." *Scottish Geographical Magazine*, vol. vi. (1890), pp. 443-453.

in 1513, when Martin Luther nailed a copy of his theses to its door, became one of the best known ecclesiastical buildings of the world. In 1640 the now venerable church lost its roof by fire, and in 1760 a conflagration, which destroyed the Castle, was the cause of a second fire, which resulted in this valuable monument of the Reformation being entirely gutted. From 1760-1765 the Wittenberg church was rebuilt, only, however, again to be made a ruin in the Franco-Prussian campaign of 1813. In 1817 there was another reconstruction, which was done in great haste, as the building was required for the celebration of an anniversary, and then, after being all but forgotten for some thirty years, plans were prepared which, after much alteration, have eventually resulted in a *bona fide* restoration being taken in hand. This restoration proper was not, however, commenced until 1882, when the late Emperor Frederick III. gave attention to the matter. The present Emperor, on taking the throne, saw that his deceased father's wishes were properly attended to, and had the necessary works carried out. As stated in a previous number, the eminent archaeologist, Professor F. Adler, acted as architect. His name vouches for the restoration being a careful one, but we fear it can hardly be said that much of the interest of the original church has been retained after all this burning, rebuilding, and restoring.

THAT strange wave of catastrophes which every now and again rolls over our globe, bringing with it a long list of floods, wrecks, fires, &c., is apparently at present at its height. From all sides reports of calamities of various kinds reach us through the daily press, and, to our regret, we notice among them a number which are solely due to long standing negligence or stupidity, strangely contrasting with the means at the disposal of mankind in the present age. Great conflagrations such as the one at Milwaukee figure conspicuously among the disasters which could so easily be prevented. A little timely forethought in the framing of local building regulations is all that is necessary for the prevention of a spread of fire over a large area; so-called fire-surveys, the organisation of fire-brigades, &c., may be of some service, yet they are mainly for the protection of separate risks as such. It would be well if American civic authorities were at last compelled to give more attention to the concise wording and the rigid enforcement of the elementary preventive legislation necessary. Their interest at present is generally centred in the quick movement of their respective fire-extinguishing establishments. Record-breaking in such "turn-outs" is the order of the day, and the science of urban fire-prevention does not, as a rule, exist.

TWO cases which should be noted have been decided during the last few days. The first, *Gillow v. Lord Aberdare*, came before the Court of Appeal, which affirmed the decision of Mr. Justice Hawkins. As we commented on the case some months ago, it is scarcely necessary to recur to it in detail. It exemplifies a tendency of house and land agents to grasp at commissions which at the best could only be due on very slight technical grounds. The fact is, there is too great a proneness among this class of professional persons to seek to be paid for work which in reality they have not done. In the present case, Messrs. Gillow sought to make Lord Aberdare liable for a commission on the sale of his house when they had done no more than let it to the purchaser some months previously. It is very desirable that house-agents should understand that they cannot claim commission unless it is clearly shown that there is a contract between them and the house-owner, and that the agreement with the hirer or buyer, as the case may be, has been directly caused by their work and labour. It is, therefore, clear that if a mortgagee wishes to safeguard himself he, as well as the mortgagor, must enter into a contract with the

surveyor to give certificates, so as to bring into existence a contractual relation. Then, if the surveyor does not perform his duty he is liable to pay damages.

THE case of *Dennis v. Gould* is, perhaps, one of greater interest to readers of the *Builder*. Mr. Justice Wills says that similar cases must have occurred over and over again, but we should hope that this is a judicial exaggeration. The plaintiff was a mortgagee, and advanced money to the mortgagor on the security of certain houses in course of erection. The money was advanced on the certificates of Gould, a surveyor at Ilfracombe. Some of the work was imperfectly performed, and thus caused a loss to the plaintiff, who thereupon sued Gould for the damages. The Official Referee, before whom the case was originally tried, found, as a fact, that Gould had been guilty of gross negligence, but not of fraud. Then the question came before the Queen's Bench Division whether, under such circumstances, the plaintiff had any legal ground of action against Gould. The Court had no difficulty in finding that he had none. There was no contract between Gould and the plaintiff, and there was no fraud on the part of the latter; if there had been, the action would have been attainable. This seems rather hard on the lender, who, in addition to having lost some money, was, of course, saddled with the costs of the litigation.

WE have received several of the Parochial Annual Reports which are usually issued about this time of the year. From that of the parish of St. Luke we learn that the question of constant water-supply for all houses in the parish has been before the authorities, and application made to the County Council to call on the New River Company to give a constant supply, with the result of a reply from the Council stating that they would make every endeavour to get the constant system extended to the parish with as little delay as possible. Other Vestries would do well and would be acting in the interests of the general public as well as their own if they would follow this example, and agitate for constant water-supply where it does not already exist. The report states that the system of emptying the sewer gullies by night has been found advantageous as avoiding public nuisance. The Chelsea Vestry report is, as usual, a very well drawn up and very full one. Among other points named is that of the smells arising from the main line sewer, in regard to which the Vestry have several times applied to the County Council, and the latter made a connection between the sewer and the boilers at the Western Pumping Station at Grosvenor-road, "by which it was hoped that the gases would be drawn out of the sewer and burned in the flues." Subsequently Mr. Eneas Smith informed the Vestry that he intended to carry pipes up his new buildings on the plot of land on the Chelsea side of Battersea Bridge, which he hoped would, in conjunction with the pumping station, effectually free Cheyne-walk from smells. We shall look in next year's report for the result of these efforts. In the Report to the Kensington Vestry by Mr. Weaver, the Surveyor, there is reference to serious complaints about drain smells in the north district of the parish:

"Occasionally, the smell was so alarming, that persons were afraid to light the gas burners in their houses, under the idea that the gas was escaping in their premises from damaged pipes. As the result of investigations above ground and in the sewers, the nuisance was found to arise at the works of the Great Western Railway Company, by Wormwood Scrubs. At this spot the said Company manufacture compressed oil gas, and the waste water and surface drainage from the works found its way into the drain from the premises, running under the Great Western Railway, running eastward under the Gas Light and Coke Company's land, and thence into the head of the main middle level sewer to the west of Edinburgh-road. So pungent and offensive was the smell arising from this contaminated water, that its passage through

the middle-level sewer from the sewer's commencement as aforesaid, right through Notting-hill to the Bayswater-road, was sufficient to charge the whole atmosphere of the district. Upon the Great Western Railway Company being called upon to abate the nuisance, they expressed the utmost readiness to do anything to abolish the cause of complaint, and as the outcome of consideration and experiment, the drain from the works has been entirely severed from the outlet drain under the way, and the whole of the drainage (which is from soil) is run into two iron cylinders, each 6 ft. diameter and 25 ft. long, sunk vertically 6 ft. into the ground. The whole of the offensive water is intercepted in these iron catchpits, from thence it is pumped up into an open gutter carried above the roofs of the workshops and run into a large iron cistern, from whence feeds the boilers for generating the steam for engines on the works. There is every reason to expect that the works thus carried out at considerable expense will be the means of abolishing a great nuisance about which complaints in the north district of the parish have been rife for years."

We shall be glad also to know the result of this action. The collection and disposal of the refuse of the parish is becoming a matter of difficulty, and Mr. Weaver suggests that reorganisation will be necessary, on more economical lines. He points out that the individual care were exercised in keeping clean of the dust-bin everything that could be inoffensively burnt in the house, about half the cost of the work would be saved to the Vestry. Mr. Robson's Engineer's and Surveyor's Report to the Willesden Local Board is very well drawn up. He insists strongly on the necessity for reform in the road maintenance of the district, but we regret to see that he recommends wood pavements so strongly. It is about the least sanitary pavement for town districts. The subject of trees overhanging the public roads is referred to as a new difficulty; the owners will not obey notices to trim them, and the Surveyor's department has been keeping them trimmed where more required, without any organised system. The sewers in the district are flushed twice weekly, and found perfectly free from deposits. Many other points connected with public health and convenience are touched upon in this report, which contains a great deal of information and suggestion put into a readable form. We have one or two other similar reports before us which we will return to.

A CORRESPONDENT sends us a cutting from a recent number of the *Halifax Courier*, referring to our comments the other day on advertising broadsheets from architects, apparently with some surprise at the rigour of our views. The Halifax journal wants to know what the *Builder* would say of "architects who are in the habit of receiving one and a-half per cent. upon contractors' estimates, of supplying a considerable portion of the apparatus, &c., through the wholesale firms for whom they are acting as agents, and from whom they undoubtedly obtain a very handsome commission." Most of our readers know pretty well what we should say, viz.: that such people were making money dishonestly, and that if they were members of the Institute of Architects, they would be liable to be struck off its list on such a ground. But we cannot say that we have any of the direct knowledge of such practices which the Halifax paper seems to be in possession of. We are told that there are architects who do this kind of thing, and it may be true; but they are a kind of architects with whom it has not been our misfortune to come into contact. Some light however is thrown on this pessimist creed of the Halifax editor by a report (from another journal) of a speech in the Town Council, a week or two later, on a question of the architect's commission for a fire brigade station. They had first written to the architect to know what his commission was, and he wrote back to say it was 5 per cent. The speaker continued—

"They wanted to know next what he charged the contractors, and they found that he charged them 1 1/2 per cent. for bills of quantities, making 6 1/2 per cent. The sub-committee found, also, that in one of the contractors' bills of quantities there was

be a fourth of the material which the contractor does not supply. In other words, he had to allow 40%, or so on, which the architect supplied, upon which the contractor had to pay the architect a commission of 1% per cent. Of course, this was added very in consequence to the contractor's estimate to the Corporation, and the Corporation had to pay both the contractor. This system, he should be carried on, more or less, in every contractor's work. He was not going to say how much an architect would receive from the tradesmen who supplied material. It was certain, however, that he would not order goods to be supplied unless he had the commission on them."

the simplicity of this utter disbelief in the capability of honourable conduct of business on the part of an architect is certainly amusing; and the fact that two Halifax members within a few days contain an expression of the conviction that architects habitually get commissions from contractors and that the people seems to indicate that there are architects in that neighbourhood who have furnished ground for this belief.

THE *Western Mail* of October 28 gives an account of a visit of inspection of the directors of the South Wales and West of England Girder Company to the new works at Cardiff. The object of the company is to export girders direct to Cardiff from the Continent, the steel girders used in Wales being hitherto been obtained through London firms acting as intermediaries between the Belgian manufacturers and the consumers. This is of course in a commercial sense a perfectly sound and reasonable undertaking. The objectionable point about it, to which we have before referred, is that several of the directors are architects, and have thus a commercial interest in supplying girders to be obtained through their company; that is to say, they have an interest in the materials to be used which is not necessarily the interest of their clients. One of the architects whose names appear in a printed list of directors are members of the Institute of Architects. Two of them are members of the "Society of Architects."

THE case of St. Giles's Church, Camberwell, forms rather a serious indictment against Caen stone, for the London atmosphere at all events. According to the appeal of the Vicar (in the *Times* of November 1), £1000 will have to be spent on the tower and spire of this church, erected not many years ago from the designs of Sir Gilbert Scott, in order to make them safe, on account of the extent to which the Caen stone has decayed during this limited period.

THE September number of "S. A. A. Notes," the publication of the Sydney Architectural Association, contains a paper by Mr. Maiden, Curator of the Technological Museum of Sydney, and Botanist to the Forests Department, on "Some of the paleo-wood timbers of New South Wales." This paper contains the description, by a report, of many of the hard-wood timbers of New South Wales, which is of interest in itself, and may be of practical use to English architects or builders who are desirous to make use of any of these woods.

THE tenth exhibition of the Institute of Painters in Oil Colours, opened this week, contains about the usual proportion of interesting work and of mere mediocrity, but a few rather exceptionally good pictures. Among these latter is Mr. Joseph Barker's "Golden Wedding" (80), an admirable study of character and personalities every-day life, the head of the old lady, one of the "golden wedding" pair, alone having a certain elevation of character. Mr. Shannon's portrait of a little boy (97) with a black cat at his knee, is in his best style. The President appears with a new class of subject (form) in "Approaching Michaelmas" (143), a tall rich-toned picture of a white country estate amid masses of foliage, with a few trees in the foreground; the work is so fine

in feeling and colour that it is a pity it had not a less prosaic title. Mr. Hugh Carter's "Rest by the Way" (10) is a superior work of its class, more solidly painted than many of his, and with less of the reminiscence of Israels which used to pervade his pictures too much. We do not think Mr. T. B. Kennington does himself justice in such works as "Engaged" (370) and "The Marriage Column" (540), which are commonplace in sentiment (very unusual with this thoughtful painter) and rather *clinquant* in colour. Mr. Fulleylove has a fine architectural picture of "The Piazzetta Venice" (414), in which the architectural detail is admirably shown; and Mr. East sends a beautiful landscape "The Clairwin Valley" (513). Among works to be noted are "The Breezy Blue" (13) by Mr. R. W. Allan; "A Sussex Lane" (103) by Mr. Wimperis; "The Lotus Gatherers" (171) a beautiful little bit of colour, by Mr. A. Drummond; a lion (200) by Mr. Nettleship; "The Mill," (207), a clever little study of moonlight effect, by Mr. Philip Burne-Jones; "In the Shadow of the Great Pyramid" (291) by Mr. J. Farquharson; a very clever study of night effect, "Moonlight" (440), by Mr. A. Harrison; "Confirmation Day" (532), by Mr. A. Chevallier Taylor; and "The Birth of a Storm" (549), a beautiful little landscape composition by Mr. F. G. Cotman.

THE pictures by Herrier, a former member of the "Barbizon school" of painters, now collected at Messrs. Boussois & Valadon's in New Bond-street, are worth looking at, but we think they have been rather overrated by critics who wish to make up to the painter now for undue neglect during his life-time. There is a power in his landscapes, especially in the large one called "Old Oaks in the Forest of St. Germain," which has something of Constable about it; but for the most part his colouring is grim and unattractive, and his subjects not happily chosen; the effect of the collection as a whole is, in fact, rather depressing.

THE collection of water-colour drawings by the late Charles Robertson, at the Fine Art Society's Gallery, is well worth a visit; it is a large and varied collection, showing the great technical talent of the artist, but showing also his limitations in regard to human character and expression. The large drawing called "Loot" is an admirably-painted Eastern scene, but there is no interest or character in the figures except as parts of a composition. His "Puppies" is a splendid flower piece, giving the *thin* character of the flowers which is often overlooked in painting. Some of the mere studies, such as that of the camels in "Sketch in the Market, Tangiers," are of great interest; and there are many fine bits of landscape, notably "Moonrise," with the timbers of the old jetty winding out from the foreground, like the skeleton of some extinct animal.

MR. SAINTON'S silver-point drawings of "The Ballet and Fancy Subjects," at the Burlington Gallery in Old Bond-street, show admirable drawing and a great mastery of this method of execution. A few of the subjects are pretty, and there is a good little nude study, but for the majority we can only regret that so beautiful a form of art should be thrown away on subjects which are both ugly and vulgar.

WESLEYAN CHAPEL, STOURTON.—On the 22nd ult. a new Wesleyan Chapel was opened at Stourton, a village near Hunslet, on the outskirts of Leeds. The chapel has been built from plans prepared by Mr. Thomas Howdill, architect, Leeds. The building is of brick, with stone facings, and is in the Italian Renaissance style. Inside, at the end opposite the organ, is a gallery, lighted by semi-circular topped windows, with leaded lights. Behind the chapel are vestries connected with the old building. There is accommodation for between 500 and 600 persons in the chancel. The cost of the structure has been about 2,000*l.*

LETTER FROM PARIS.

THE State entrance of the Palais de l'Elysée—the usual residence of the head of the State, was, until recently, adorned with the imperial arms which, on the accession of Napoleon III., had replaced the fleur-de-lis of the house of Bourbon. This innovation has just been redited by the Direction des Bâtimens Civils, which has thought itself bound to replace the arms of the fallen dynasty by a cartouche bearing, in the middle of a decorative trophy, the monogram "R. F.," officially adopted by the Republican Government. One cannot too strongly protest against the perille intolerance which thus attacks public monuments and effaces the traces impressed on them by history. Only fifteen years since, when Duc, the architect, replaced the bouquets of fleur-de-lis which formerly crowned the gilt pilasters of the grille of the Palais de Justice, the Municipal Council of Paris was indignant at the change, and for a long time refused, for this cause alone, to erect to the memory of the eminent artist the monument which Chappin was to have executed and which is still unfinished.

A page of history cannot be effaced, and the mutilation which a too zealous functionary has inflicted on M. Carnot's residence is as absurd as if one were to efface from the walls of the Louvre, or of Fontainebleau, the cipher of Henri II. and Diane de Poitiers. Besides, a mere monogram has no heraldic signification, and considerations of decorative art demand something better. A distinguished architect, M. Boileau, has just addressed to a Parisian journal a very sensible letter on the subject, in which he observes that a modern artist, M. Coquart, has invented, in the new chamber of the Cour de Cassation, just the device that was wanted:—

"Le plafond, un véritable chef-d'œuvre moderne du genre, s'appuie à cet endroit, sur une corolithe très puissante. L'Architecte l'a relevée par un décor triomphal extrêmement important on se résume le chiffre de notre Gouvernement. De vrais drapeaux tricolores, en soie française d'or, habilement drapés, émergent des rondes bosses et forment comme une gloire autour des enfants, des faisceaux, des tables, des branches de chêne et de laurier. C'est d'un merveilleux effet et d'une ampleur incomparable. Or (conclut M. Boileau), alors que, dans des édifices construits sous notre République, des architectes, plus inspirés sous d'autres régimes, ont à peine indiqué, n'importe où, sur R. F. peu compromettant, un homme d'un talent hors de pair met tout son cœur d'artiste à créer des armes splendides pour le Gouvernement dont il est l'architecte et . . . on le révoque sous prétexte qu'il a mis trop longtemps à terminer son œuvre!"

This is the fact, and it is worth putting on record as an instance of the despotic behaviour of the last Minister of Public Works towards M. Coquart, who has carried with him into his retreat the esteem and regret of the whole artistic world of Paris.

The Parisian press is also much occupied with the proposal to transfer to the Panthéon the remains of Renan, Michelet, Edgar Quinet, Arago, Lamartine, Ingres, Meissonier, and Thiers. In regard to this last, there will be difficulty, for the extreme Left will hardly pardon the man who put down the Commune; and on the other hand his representatives refuse to abandon the tomb in Père Lachaise. M. Léon Say, the author of the proposal submitted to Parliament, maintains that all objections may be provided for by erecting in the Panthéon commemorative monuments which need not be in the nature of tombs. In this manner, instead of depositing the remains of eminent men in a dark and damp vault, we might have, in the temple itself, an assemblage of memorial statues recalling the celebrities of past times. This would be a solution, but it is not a very possible one in a hulloing the walls of which are already lined with paintings executed by the masters of the modern school. They talk much of making the Panthéon "the Westminster Abbey of France"; but to do that one would have to lay aside political fanaticism, and, here as in London, to have a building dedicated to the whole past history of the nation; and there is much to be altered before such an idea as that can be realised!

The first competition for the decoration of the salons adjoining the Salle des Fêtes of the Hôtel de Ville has just been decided. Fifty competitors responded to the invitation of the administration, but nothing very extraordinary has been produced. People are getting tired of these competitions, and it must be admitted that the recent results from them have not been very fortunate. In the present case six artists have

been chosen, three for each salon. They are MM. Bonis & Mouré, Danger, Delame, Jules Ferry, Henri Martin, and Bigaux & Simas. They are to send in next April portions of their designs full size, after which the final decision will be made. The second competition for the decoration of the Mairie of Montreuil will be decided shortly. The three competitors are MM. Bourgonnier, Gorguet (in collaboration with M. Courtois) and Henri Martin.

Another project to be submitted shortly to the Municipal Council is that for the decoration of the Mairie of the twelfth arrondissement, which, according to the scheme of the architect, M. Auburtin, will include four large panels of historical painting, and a marble bust of the Republic, which latter will probably be entrusted to M. Ernest Barrias. It is to be hoped that in this case the artists will be required to execute the work *in situ*, to avoid the disappointments which have been encountered in the Hotel de Ville when paintings executed in the studios have been fixed in their place.

Both at the Hotel de Ville and in Parliament much talk is being made about the sanitation of Paris, which has been gravely compromised by the system of "tout à l'égoût." This system, laid out by the late Durand Clave, is worse for the suburban districts than for Paris proper, where the Seine water is but rarely employed for cooking or drinking, and where the addition of the water from the sources of the Acre and the Vigne will furnish an addition of 100,000 cubic metres annually. The question, long discussed, has been again adjourned, for a month, by the Municipal Council, in order to allow time for the Administration to formulate a new scheme for obtaining a further water supply from Loing and Lannain. At the same time the scheme will be considered of an aqueduct starting from the plain of Achères, beyond St. Germain, to take the sewage not to the sea, as has been many times demanded, but towards the sea, and to utilise it for agricultural purposes on the lands along the route.

It is proposed also, for providing for the more sanitary condition of Paris, to constitute, in regard to dwellings, that which already exists in regard to individuals in the records of the "Casier Judiciaire." The "Casier Sanitaire" will include a sketch and description of each house, a record of population and sanitary condition, an abstract of the operations of disinfection carried out, information in regard to the systems of removal of house refuse, as well as in reference to lodgings recognised as insanitary, and records of any scientific investigations or sanitary inquiries specially made. The system of inquiry instituted by Dr. Martin will apply to 80,000 habitations in Paris, and will necessitate an expenditure of 70,000 francs in organisation.

The clearing out of the neighbourhood of the Palais Royal is a project which is partially of a sanitary nature, and which is again under discussion. The Banque de France wishes to acquire, for the purpose of enlarging its establishment, all the houses comprised between Rue Bailly and Rue des Petits Champs. This operation will include the suppression of the Rue Radziwill, and a fine terrace, with steps for access to it, will replace the houses which border the Rue Beaujoulais and Petits Champs, so that the north face of the Palace, facing the National Library and the Rue Vivienne, will be completely opened out.

The work at the Musée Galliera will shortly be resumed, when the decoration of the interior will be commenced. It is hoped that the building will be ready for opening by the end of 1893.

The statue of Beaumarchais executed by M. Clausade (whose design was selected in public competition), is nearly completed, and will be shortly put up in its intended place at the angle of Rue St. Antoine and Rue des Tournelles.

We have already spoken of the proposals of the Government in regard to a great exhibition in 1900. To the schemes already formulated has just been added one by M. Saint-Lanne, who proposes to take the Seine as his basis of operations, and to establish on it a bridge-terrace of vast proportions, the four towers of which are to light the whole exhibition. The author of this proposal, which we mention merely as a curiosity, proposes also to annex for the purposes of the exhibition all the military zone between the Porte d'Auteuil and the river, and to transform the fosse of the fortifications into a canal with an electric railway on each bank. The whole scheme will include

a superficial area of 165 hectares, a third more than the extent of the 1889 exhibition.

It is announced that M. Ronjon, Director of Fine Arts, has proposed to the Minister of Public Instruction that all objects of art which are to be purchased by the State should be submitted to a new consulting committee. This committee would include not only the delegates of the Administration, but the best and most learned experts in the arts concerned, whose high standing and acquirements would give a kind of special recognition to objects purchased for the national museums. At the same time he would propose to send to special museums all objects of art or curiosities which did not come directly under the heads of painting, sculpture, or architecture. M. Ronjon's proposal can only be commended, and it is to be wished that the Municipality of Paris would follow the same example, in which case less money would be sacrificed on mere *eric-à-brac*, and the public would not be imposed on with objects of but small artistic or historic value; such for instance as the portrait, by M. Yvon, of the little negress brought by Lieut. Mizon last summer from the banks of the Niger to Paris, and which has no interest in connexion with Parisian history. It has even been proposed to present to the Carnavalet Museum the marble table at which Ravaochol lunched at Véry's restaurant, just before his arrest. Fortunately the Préfecture has refused to regard the Carnavalet Museum as an annex of the Tussaud Gallery, and has declined the fantastic offering.

At the Ecole des Beaux-Arts the jury has decided the first two prizes in the Janval-d'Attauville competition. That in the section of historical painting has been awarded to M. Guillemot, pupil of M. Cormon. The first prize in the landscape section has been awarded to M. Foreaux, pupil of MM. Harpignies, J. Lefebvre, and Olivier Merson.

There have been serious losses in the art world during the past month. To the names of Signol, Giraud, and Vital-Dubray, of whose death mention has been already made, we have now to add those of the landscape painters Lépine and Gosselin. Gabriel Vital-Dubray was born in 1813. A pupil of Ramey, he obtained a third medal in the Salon of 1844 for his "Joueur de Brottola." Among his numerous statues of celebrated persons we may remember especially the equestrian statue of Napoleon I. at Rouen, that of Jeanne Hachette at Beauvais, that of the Empress Josephine, formerly in the avenue of that name and now in the museum of Auteuil, those of Clodion, Sully, and Marshal Lannes, and the monument to Perdonnet, the engineer, in the cemetery of Père Lachaise. Vital-Dubray was Chevalier of the Legion of Honour since 1857, and was promoted to the title of "officier" in 1864. During orders of the day for the army for his brave conduct at the battle of Bezeneval.

M. Stanislas Lépine, who died from an attack of paralysis at the age of fifty-seven, was a pupil of Corot, and exhibited regularly at the Salon, since 1859, his landscape on the banks of the Seine, painted with a rapid and firm hand. He excelled in representing the delicate grey and misty effects of morning. Among his pictures of this kind were the "Pont d'Iena," the "Pont Marie," the "Canal de la Villette," the "Pont des Arts," the "Jardin des Tuileries," the "Marché aux Pommes" (which gained him a third medal in the Salon of 1889), and lastly the "Pont Royal" and the "Pont de l'Estacade," for which he received a gold medal in the 1889 exhibition. Some months before his death he had finished a view of the Seine at the Pont Neuf, for the Salon des Sciences at the Hotel de Ville.

It was also for the Hotel de Ville that Charles Gosselin executed one of his last works, "Les Tanneries de la Bièvre," which decorates the side gallery of the grand staircase; a work, it must be admitted, much inferior to most of his former productions. He was born in 1834, and studied with Gleyre and Charles Bonsson. He began exhibiting in 1863. His manner of painting was careful and life-like to nature, which he observed attentively, and his pictures were full of a charming simplicity and truth. He excelled in autumn scenes. The valleys of the Jura, the plains of Picardy, and, latterly, the woods of Versailles have been some of his favorite subjects. In 1882 he was nominated Curator of the Versailles Museum, and President of the "Société

des Amis des Arts" of Seine-et-Oise. In this double function he was much appreciated, for his administrative qualities and kindness of disposition. Charles Gosselin received medals in 1865 and 1870, a second medal in 1874, at the Cross of the Legion of Honour in 1878. The Paris journals have announced the sudden death of M. Alfred Michièle, at the age of seventy-nine. He was librarian of the Ecole des Beaux-Arts, and a distinguished art critic. He leaves a considerable amount of literary work behind him. We may notice among his principal works "L'Art Flamand du XI^e et le Midi de la France," "L'Architecture et la Peinture en Europe depuis le XI^e Siècle jusqu'à la fin du XVI^e," and also "L'histoire de la Peinture Flamande." M. Michièle was a learned and indefatigable worker, whose loss will be much felt in the world of art and literature. We have heard at the last moment of the death of M. Pouget, former pupil of Questel, who began early in life with some important works. He has died at the age of forty-three. He had been a member of the Société Centrale des Architectes since 1890.

MISS PENROSE'S LECTURES.

THE short course of lectures on Greek vases at the British Museum, which Miss Emily Penrose (daughter of the eminent architect) has just brought to a close, is noticeable more especially for the attention paid throughout to details of *technique*. We have heard much of the more popular side of the subject, mythology, and there was ample room in this new departure. We may say at once that Miss Penrose is very happy in her combination of simplicity and intelligibility of presentation with a scientific attention to fact. Starting with the definition of man as "an animal that cooks his food," the first lecture dealt with ceramic imitations of skins, gourds, baskets, and the survivals of these several forms were clearly illustrated. The use of the potter's wheel was explained, and some comparisons instituted between modern and ancient potteries; the processes of drying, painting, and firing followed. The earliest specimens of archaic vases were then classified as follows: Primitiv, Mycenaean, Geometric, Transition (including the vases of Phaleron, Rhodes, and specimens from Nankratris), Oriental. The second lecture dealt with the shapes and uses of vases, as here a word more might have been added as to the relation between use and shape. The amphora, being a vase for storing, is distinguished not only by its two handles, but by the narrowing of its neck; the krater open, but bell-shaped for convenience of stirring and mixing; the oinochoë is broad-necked for wine-pouring; the kylix has narrow for the dropping of oil. Passing to the black-figure style, the lecturer noted the different manner of applying white in the Primitive and Black-figure period, and showed how the gradual development of the Black-figure style was marked by the abandonment of the rosette, the modification of the frieze system, the introduction of inscriptions, and, as regards subject,—the gradually increasing prevalence of mythology. Many of these points were illustrated by a full examination of a portion of the famous François ware. The transition from the Black to the Red-figure style was effected by the group of painters who centred round Epiktetos, and probably the first Red-figure decoration is to be found in the Gorgoneians that decorate the interior of early vases.

The kylix, in fact, as someone has well observed, sprang from being the Cinderella of the Black-figure period to the Princess of the Red; but the decoration of its interior presented difficulties long apparently insurmountable. The artist at first only transplanted the panel designs of his Black-figure amphora to the sides of the kylix, filling up the vacant space with first a palmetto, then a huge eye, or a siren or a sphinx; a little later a winged horse, then a horseman mounted, and finally the horseman becomes incorporated in the design, which spreads uniformly over the whole space. As to the rendering of detail, incised lines quickly disappear; Enphronios, e.g., an early master, rarely uses them; colour is eliminated, and by degrees the eye, once sharply differentiated for man and woman, is rendered alike for both, and gradually drawn correctly in profile. A further note of date is the treatment of the eye-lash. Still more stress was laid on drapery.

as a means for chronology. At first, the chiton appeared solid and sheath-like, in Noah's Ark fashion, taking no cognisance of the form beneath. Then, by the time of Euphronios, the limbs are drawn in, and show through the drapery, though still without governing its folds. The Doric chiton went in and out of fashion more than once, and its presence should always be noted as a mark of time. Attitude, again, is very characteristic of different periods: first, we have front-facing figures, with profile feet, their figures balanced on both feet; next, on one, the supporting foot being frontways, the other sideways, then precisely the reverse. In this respect vases follow the fashions of sculpture.

As to subject, fashion varies considerably. The mature Black-figured style adopts, in the main, subjects that are mythological. Epiktetos and his set love to depict daily life. With the early Red-figured style, Athenian mythology comes to the fore, and Theseus supplants Herakles. History is not without its influence. In 460 B.C. a colony in the Strymon is sacked by the Thracians; immediately after we have an outbreak of vases representing the slaying of Orestes by the Thracian women. In the fourth century the Theban shake off the tyranny of Sparta, and they see the mythological prototype of their own victory in Herakles strangling the snakes,—a subject which crops up suddenly on coins and vases.

With Brygos, of whose work the British Museum possesses a splendid specimen, the glory of Red-figured vase-painting culminates and closes. Excessive ornament, reintroduction of the colours so successfully eliminated, figure in relief, minuteness and excessive detail, attempts at perspective, are all so many downward steps. Odd though it may seem, the decline is traceable to the great masters, Polygnotos, Mikon, and the like, whose masterpieces in fresco seem to have intoxicated vase-painters and led them to forget the limitations of their handicraft. Miss Penrose closed a very instructive course, listened to with obvious interest, by a brief notice of the new Branteghem vases, *a propos* of white-ground style, and of the Græco-Italian schools. Each lecture was supplemented by a demonstration in the vase-galleries.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

WE resume our report of the proceedings of this Commission.

The Kennet Reservoir Scheme.†

In his examination as to this scheme, Professor H. Robinson said that continued communication between one side of the valley and the other is provided for by means of a roadway on the embankment which separates the lower from the upper reservoir. He adopted 600,000,000 gallons a day as a convenient figure, because the reservoir would provide the necessary storage to give that amount. Then, said Sir G. Bruce, it was rather the capacity of the reservoir that was indicated by the figures than the needs of London? The Professor put it this way, that the provision for a future population of 10,000,000, which would be afforded by the reservoir, seemed to meet the condition of things that could be reasonably contemplated by the Commission. He did not mean to say it was necessary that 300,000,000 gallons should go over Teddington weir; and, if that quantity were not deemed to be required, there would be more left for the population. About five-sixths of the 350 square miles of gathering ground was pervious material, such as chalk. The bulk of the water in the Kennet was derived from the chalk by means of springs, and a rainfall of 30 in. would give 10 in. available for the reservoir. Sir G. Bruce remarked that nothing like that had been stated to the Commission, who had heard of 4 in., or 6 in. at the outside, and he wanted to know whether the river had been gauged. No, it had not; but other streams gave records of 9, 9.61, and 8.8 in., with smaller rainfalls. Asked whether the water falling upon the five-sixths of surface that was chalk might not pass away without coming into the reservoir at all, he said the configuration of the ground showed that the great

bulk of the water falling upon that area would gravitate to the centre; and the river itself ran over impermeable strata. The sections of the wells showed the line of saturation clearly, and indicated that the water falling upon that area would be thrown into the valley. It was quite clear to him that 10 in. out of the 30 in. would be received by the Kennet; and, if 10 in. were considered too high an estimate, it was only one-fifth of that 10 in. that would really be required. In the sections put in he had given so much detail that he thought he had shown conclusively the Kennet Valley would be, or would be made, perfectly water-tight. The puddle tunnel need not be continued more than two miles out of seven on one side, because all that had to be done was to bring the hydraulic gradient down to a certain point,—10 ft. in the mile,—so that the water could not travel. It would be seven miles to where the mottled clay came up to the top water-level, but a hydraulic gradient of 10 ft. in the mile only would prevent the leaking of any water through this pervious stratum. Throughout the district generally the hydraulic gradient is from 15 ft. to 30 ft. in the mile; but where it is only 15 ft., a very slight amount of water is yielded by this thin layer. If it were brought down to 10 ft., no water would travel at all, and what tendency there was for it to travel through the thin bed would be diminished slowly by the closing up of the pores in the thin layer. By putting in the tunnel for the short distance, and by reducing the hydraulic gradient to 10 ft. in the mile, the possibility of the travel of the water through that pervious bed was reduced to a minimum; in fact, it vanished. Of course, said Mr. Hill, the longer distance you give the water to travel, the more chance there is that it will not escape; but what would the puddle-tunnel be? Well, it would be a drift about 20 ft. high by 8 ft. wide, worked by shafts from the surface and filled with puddle. But would not that settle and allow the water to pass? That would have to be provided against; it would be a work of time and care. Would not an open cutting be better? In some places it might, but at others shafts and a tunnel would be better. What if the mottled bed of clay did not extend over the whole area? Well, he relied upon that mottled bed of clay; if it was not continuous you got to the chalk; but the great object of his elaborate investigations and sections was to make certain, and to show that the mottled clay does extend over the area. If it did not he should not believe in making a reservoir there. By well-sections and surface indications the position of the mottled clay was determined and defined beyond possibility of question; that was the opinion of the geologists who were re-mapping the area for the Geological Survey; and he had got a plan which showed the re-mapping of the valley. There were a great many wells, and in one at Thatcham Vicarage the water stands higher than in the Kennet at Newbury. This shows that the water is passing from the chalk area to the Kennet, and not flowing in any other direction. Would not a large part of the reservoir be very shallow? No; on the contrary, what makes the valley exceptionally favourable for the purpose is that the London clay on both sides rises very steeply. He had made an examination of the area of the Thames, with the view of finding a site for a reservoir, and, although there were many possible sites, there was no site, in his opinion, equal to the Kennet Valley, because it had such steep sides, and so small an area of land would be uncovered by a fall in the water level. The contours, said Mr. Hill, seemed to indicate a shallow area? But that is the upper reservoir, which is always to be kept filled, and only drawn upon in times of drought. In the lower part of the valley, from which abstractions would be made, you have the steep sides. The information that the London clay had been incorrectly mapped, and that there was to be a correction of the Geological Survey, had been obtained from Mr. Blake, the Government geologist stationed at Reading. Asked by Sir A. Geikie to indicate on the sections the nature of the information and the data for the correction of the Survey, he said that one section was to be taken with another. On section 7 the position of the mottled clay was fixed by the Aldermaston Brewery well.

Sir A. Geikie: That is the only well on the section, and the only well on section 3.

Witness: That is the most important well.

Sir A. Geikie: But you have no other evidence for your section except that well?

Witness: Not on that point.

Sir A. Geikie: No, nor at any point of that section along the part covered by the reservoir.

Witness: No, not at that point.

It was not one fact, he afterwards explained, but many facts put together, that led to the better determination of the position of the London clay. There were data covering a large area of the ground, and the sections plotted together told the story completely. The witness having illustrated this and mentioned the Woolwich Farm well,

Sir A. Geikie said: I do not know, but it appears to me now that the evidence you have is not quite sufficient for the drawing of accurate sections. That is the impression that it makes upon my mind. I think it is quite true Mr. Blake is right in the correcting of the original map of the Survey, and I think that one well itself would show that there was probably some error, though I doubt very much whether the evidence of your sections is entirely to be relied upon.

Witness: I am sorry to hear you say that. Mr. Blake has authorised me to say that he has relied on these sections, and that they have materially assisted him in mapping out the district. If ever there was a case in which an enormous mass of information was available to determine accurately the position of strata, these sections furnish it. All the geologists in the neighbourhood consider it mapped out accurately.

Sir A. Geikie: It is one thing to trace a boundary line in a valley occupied by alluvium, and another thing to make a reservoir. I accept what is said by Mr. Blake and yourself, but I would like to get something beyond as to the floor of the valley being clay.

Witness: Quite so, and it is for that reason these sections have been lithographed.

Sir A. Geikie: But could you not put the data on them?

Witness: The difficulty is to do it intelligibly. The original plans and sections at my chambers would only be confusing. I have given all the material facts.

The witness added that he believed, from all the information he had obtained from geologists, that the mottled clay might be regarded in that district as unquestionably impervious throughout. He only mentioned the possibility of supplemental supply from Hampshire and Wiltshire in case it should be deemed necessary to provide for a larger population than 10,000,000, or to give a larger supply per head than 30 gallons.

The Nine Reservoirs Scheme.

In order that the nine reservoirs proposed by Messrs. Marten & Rofe may be referred to by numbers, it is necessary to remind our readers that the following are their names or localities: 1. River Windrush, above Barford. 2. Sherborne stream, above junction with Windrush. 3. River Chewell near Moreton Pinkney. 4. Sor Brook, Broughton, near Banbury. 5. River Swere, near Aderbury. 6. Stream near Deddington. 7. River Dorne, near Woodstock. 8. River Glyme, above Woodstock. 9. Thame, at Hardwick, near Aylesbury. Details of these nine reservoirs were given on page 318 of the *Builder* of October 22.

Mr. Henry John Marten and Mr. Henry Rofe were both examined upon their joint scheme.

Mr. Marten's Evidence.

Mr. Marten said that the instructions given to him on behalf of the Conservators of the Thames were to consider whether by storage reservoirs he could augment the flow of the river so as to allow the companies to double their abstractions without reducing the dry-weather flow at Teddington below 200,000,000 gallons. That might be taken as the minimum flow, on a few days of rare beat and drought, above the quantity appropriated by the companies, whose maximum had been 107,000,000. The general conclusion came to from the data available was that another 107,000,000 would last about forty years. Then, deeming it probable that the Thames Valley would supply that additional quantity, he and Mr. Rofe, assisted by Dr. Henry and Mr. Horace Woodward, looked to see where the water could be stored and paid out at the right time. They also consulted Mr. Topley and Mr. Boyd Dawkins, and concluded that it was feasible to make the nine proposed reservoirs and others. They endeavoured to avoid railways, canals, and occupied valleys, and to divide the storage so as to avoid inconvenience from the repairs of one large reservoir.

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 41, 42, 45, 48, 50, 53; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 208, 316, 338.

† See *Builder* for October 22, p. 316.

From particulars furnished by the Board of Agriculture, he found that the population above these reservoirs would be about 1 person to 5 acres. Of the gathering ground 56 per cent. was arable and 44 per cent. pasture. There was rather less than one animal to an acre. The population was rather decreasing, and a good deal of the land was going into pasture. The reservoirs would be good in themselves; but there might be some doubt about Nos. 7 and 8 on the Dorne and the Glyme. That is all in the Upper Oolite; but they went into those valleys because in Blenheim Park there is a reservoir of 130 acres, which is a fairly tight one. The rocks which would form the sides of the proposed reservoirs contain about 25 per cent. of marl and clay measures in thinish bands. Some of the reservoirs would be at such an elevation that it would be possible to send the water down to the metropolis without pumping; but that question was not included in the reference. Pumping might be saved, but, on the other hand, there would be the cost of pipes, and the cost of pumping was being reduced nearly every day.

The Chairman: The idea of sending water down the open channel would appeal rather more to the Conservancy than to the consumer.

Mr. Marten: There are thirty-eight weirs and water-wheels above the intakes. These have an average fall of 4 ft. 10 in., and they produce an immense amount of aeration. If I understand Dr. Frankland's evidence, the water is not deteriorated in the river, and it is better at the intakes than at any other part of the river.

The Chairman: Would it be better at the intakes than when stored in the reservoir?

Mr. Marten: It would there be an improving water. To a very large extent it would be flood water loaded with a certain amount of alluvial matter, and that would settle, and, in settling, get rid of other things. So the water would be quite equal to if not better than the average of the water coming down the river ordinarily. The water from the reservoirs would materially improve the water affected by sewage.

The Chairman: Would the water in the reservoirs be such that it would be improved by going down the Thames in its present condition and would it be delivered in a better condition than if it went down in a pipe?

Mr. Marten: Aeration is of great value, and you could not get aeration in pipes; but of course there would be no contamination in the pipes.

Sir G. Bruce: The strata forming the bed of these reservoirs seem almost all to be pervious material. In the dam which holds up the water you have a puddle trench carried through the Oolite and through the Northampton Sand down into the Lias clay. What do you do about the water coming round about the side of the trench?

Mr. Marten: There would have to be wing trenches. They would vary in length with the site of the reservoir.

Mr. Hill: Do you think flood-water from a highly-cultivated district is desirable water to store?

Mr. Marten: There is no material reason why it should not be stored. This is not very highly-cultivated land, and the water from it goes into the river.

Mr. Hill: Yes; only flood-water is not taken.

Mr. Marten: The surface to a large extent is porous, and the water would not come out of the surface of the land itself, but would be filtered through it.

Mr. Hill: Owing to that porosity do they not seem to be rather doubtful sites?

Mr. Marten: The only sites that are doubtful are the two I have named, and I believe that those would turn out satisfactorily.

A number of reservoirs can be made one at a time, each succeeding one with the benefit of the experience already gained, and therefore the scheme which he and Mr. Rofe had submitted to the Conservators might be called a progressive one. It was a programme for the future, not to be carried out all at once.

Mr. Mansergh: If you have within ten or twelve miles of a town known means of increasing your supply by degrees, you would not construct works for a longer period than twenty or twenty-five years? But if you have to go a very long distance, and make an expensive conduit, you would expect to secure a supply that would last a much longer time?

Mr. Marten: Yes; and that is the justification

for the Liverpool, Manchester, Birmingham, and other big schemes. If those towns had only had a Thames by them, they would not have gone so far afield as they were obliged to do.

Mr. Mansergh: You would call these shaly sites, would you not, these two that you have doubts about? You would not gleefully begin to make them with a light heart?

Mr. Marten: Well, I should feel a certain amount of responsibility with regard to them, there is no doubt.

Mr. Mansergh: Not more than responsibility?

Mr. Marten: I felt a good deal more doubt when I had not the advantage of having a geologist with me than I do now, after taking a second view. The Blenheim lake makes me more favourable to those sites than I did at first.

Mr. Mansergh: You found an old dam 22 ft. high, with little bleedings; and you could not tell that these little streams were not coming out of the reservoir?

Mr. Marten: One of these springs, as they are called, is made use of for the supply of Woodstock. The water is pumped by a turbine, which is placed at the foot of the dam; the water from the lake falls over the turbine, and pumps the water of this spring to supply Woodstock; so that if there were leakage it is being utilised. I said, if this really unscientific little dam can do all this, why I think we ought to make reservoirs here too.

Mr. Mansergh: You heard Mr. Hawksley say he did not intend to take in flood-water?

Mr. Marten: I did not gather that. I should propose to take in flood-water.

Mr. Mansergh: You think there is no harm in taking it from large watersheds and sending it down the river?

Mr. Marten: No, I think not. In Gloucestershire there is a case where water is pumped out of an ironstone pit, and it is so full of sulphuretted hydrogen that you can hardly stand near it; but that is entirely got rid of by aeration, so that in the town not a tap has any smell of gas. I look upon aeration as of very great value indeed.

Professor Dewar: If you had to supply 200,000,000 gallons a day, could you find a watershed to supply it uninhabited by man or animals, or uncultivated?

Mr. Marten: Not in England.

Professor Dewar: The flood-water coming from the lower part of this valley I presume you regard as much more impure than the flood-water from the upper part?

Mr. Marten: Yes, certainly; there is no doubt about that.

Professor Dewar: How long would the water be stored before use?

Mr. Marten: It would be in process of storing for eight months of the year; and during storage the water would undergo an amount of natural purification.

Mr. Rofe's Evidence.

Mr. Henry Rofe explained some changes that had been thought desirable after the plans were sent to the Commissioners.

Sir G. Bruce: Supposing these sites or several of them were found to be objectionable on account of the strata upon which the water is to rest, are there any other sites which you have looked at where the same objection would not apply?

Mr. Rofe: There are none that I have looked into carefully, but it is obvious from the maps that there are many other sites on the clays where the objection would not apply.

Do you feel quite sure about that?—Quite clear about it.

As to flood-waters, he did not understand Mr. Hawksley would exclude them from storage reservoirs, but only from the water which he would pump into the Staines reservoir. If he were designing a scheme for London, which this did not pretend to be, he should consider carefully whether it would not be wiser, even if it were an extra cost, to put the water into pipes. The value of the dam in Blenheim Park was that it showed you could have stable works in foundations of this character. Asked whether there was not "a good deal of weeping," he said he should be inclined to put it higher than that, but if that unscientific dam would do there, any one who knew what he was about could put a much better and safer one there. The proposed dams would be higher, but would come down to the water-tight formation; and you can make practically water-tight reservoirs.

A geological section showed rocks right up to daylight. The slopes of the Glyme and the Dorne were well grassed, and naturally puddled. The bottom was largely covered with an impervious material. He did not put these as ideal sites; they are not the best sites that could be found in the Thames Valley. The sections showed alluvial deposit, but even with this pervious material the water would be kept because the puddle trench would go down to the impervious stratum, and the water would be bound to be thrown out into the reservoir. The sections did show that in some cases it might travel laterally, but it would be a difficult thing for it to do, because even these colities were mixed up with beds of marls to the extent of 25 per cent.

It was his experience that from 25 to 200 gallons per head per day was ample to provide for large communities, where there was an average trade consumption; but it was a different thing at Middlesbrough, where two-thirds of the consumption was for trade purposes.

Mr. Topley's Report on the Nine Reservoir Scheme.

Mr. W. Topley, F.R.S., in a report to the Commission on this scheme of nine reservoirs, made the following remarks:—

No. 1. This reservoir will be mainly on Lower Lias clay with a perfectly water-tight bottom. The upper part of the sides, near the lower end, will be on Middle Lias, and, on eastern side, partly also on Upper Lias. The lower part of the Middle Lias is largely composed of sandy shales and clayey sands, and is, therefore, much less pervious than the upper part, which contains the Marlstone. By carrying the puddle-trench well into the hill on each side, and by making wing-trenches on the north-west and north-east sides of the two ends of the puddle-trench, the dam can be rendered perfectly water-tight.

No. 2. The site of this reservoir is on Inferior Oolite, and at first sight it seems a bad one, inasmuch as the Inferior Oolite is a porous rock. The soil on the hillside is rubby, but is naturally puddled to some extent on the gentler slopes. No doubt there may be some difficulty and expense in making this reservoir and its dam water-tight; but a little consideration of the physical structure of the district will show that some leakage can do no harm. The water cannot get away to the west, as the lowest level of the Inferior Oolite in the Northleach valley is higher than the top water-level of the reservoir. It is not until we reach the Chinn valley, near Hendcombe, that we have Inferior Oolite cropping out at the 500-ft. contour; this is more than three miles from the nearest point of the reservoir. If water gets away to the east, it will go partly into No. 1 Reservoir, partly into the stream above Sherborne. By measuring the compensation water half a mile below the dam, any water escaping could be utilised.

No. 3. This reservoir and dam will be on Middle Lias, the lower half of which is more or less impervious. On all sides, except at the valley where the dam will be placed, this Middle Lias is capped by the clay-beds of the Upper Lias, and the beds below the surface are not likely to be open and fissured. Water will, therefore, not have much freedom of passage. If wing-trenches be made, the reservoir can be rendered fairly water-tight. Here, also, escaping water can be measured below the dam for compensation. The estimated cost of this reservoir is low in proportion to its capacity; considerable expense can, therefore, well be incurred in making it water-tight.

No. 4. This reservoir will be mainly on the Lower Lias, and on the lower or clayey beds of the Middle Lias, only a small area near top-water touching the Marlstone. The extreme western end just touches the Inferior Oolite, where it is let down by a fault ranging south-west from Banbury. The dam will be carried down well into the Lower Lias clay. A wing-trench on the eastern side will probably prevent water escape in that direction. Any water so escaping will find its way into the Cherwell. There is not likely to be any escape to the south; if so, the water would pass into the next reservoir, No. 5.

No. 5. This reservoir is on Middle Lias, a small area being on Upper Lias. The parallel faults running east and west on each side of the valley have let the Middle Lias down into a trough, so that water tending to escape along the sides would be stopped at the faults by the impervious Lower Lias clay.

No. 6. This reservoir will be almost entirely on Lower Lias clay; it has, therefore, an impervious bottom. As originally proposed, the dam would have been on the south-east side of a fault, but the Great Oolite is brought down. This site has now been shifted a little to the north-west to avoid the Great Oolite. It will now be mainly on Lower Lias, only a small area on the south side of the fault being on Upper Lias. A wing-trench can be carried westwards on the dam on the south side; this will shut off all leakage.

I have no doubt that the whole of these reservoirs can be made practically water-tight, cost of them absolutely so. The expense necessary for this will no doubt add slightly to the estimated cost in some cases.

In his examination by the Chairman, Mr. Appleby said of the Windrush Valley reservoir that it had a perfectly water-tight bottom, and the dam would be mainly on Lower Lias. He did not see at all why it should not be absolutely water-tight. He could not conceive that there would be any objection to that reservoir, and it was the largest and most important of the nine; it was the best of the lot, and he did not wish his remarks to apply to all. Still, several of these were excellent sites.

Mr. Hill, quoting the description the witness had given of No. 2, that the soil was rubbly and naturally puddled on the gentler slopes, remarked that that was a doubtful sort of water where you had pervious material below; and the witness answered: Yes, it is. Of course, these reservoirs, when they are in use, will puddle themselves. There is a clayey soil, and a loamy soil over the slopes, and that would prevent the water getting in.

But when you are putting a depth of 40 ft., or 50 ft. of water it would make a very great difference.—Of course the tendency to force the water out is more.

You must not count upon it in the way you are going to-day?—In my statement I have said there is a possibility of that reservoir not holding water perfectly, but if it leaks the water will partly flow into the basin of No. 1, and it will partly flow into the stream to the south, in which the compensation water can be measured, and you can measure the leakage as compensation water.

But that would not be very satisfactory, I think, in a reservoir?—Well, one would rather have a reservoir that would not leak at all.

Of course, in the bottom of the valley it would, as you say, check itself?—Yes.

But on the sides where there is no deposit, the water would go on?—No. Of course the choking would be more at the higher part of the reservoir, where the water comes in. It would extend over the bottom, but not so much at the sides.

In fact, the wash of the reservoir would clean away any deposit that there is on the side?—Yes; but then you see the possible leakage can be very largely guarded against by making wing trenches.

It is very uncertain to what extent you can put a wing trench all round a reservoir. To what extent would it have to be carried?—The further you take the wing up, the greater the distance the water would have to get round it, of course. Therefore, it has a greater difficulty in getting round.

It would probably leave some deposit on its way?—Yes; I do not reckon No. 2 reservoir as one of the best. As it has been cut down by some of the engineers to get over the difficulty, it is not really of very much value. It is tributary to No. 1.

As to No. 3, it is said the beds below the surface are "not likely" to be opened and assured. How do we know that?—We know that rocks exposed to the surface are more open when they are covered with thick beds of clay.

Yes, but there is great uncertainty?—There is an amount of uncertainty; but, being so thickly covered with impervious clay, I do not think that the fissures would be very open or underneath the clay, and, therefore, water will not have very much freedom of passage here.

These are very shallow reservoirs; the drawing down of the water in summer-time would leave large areas bare?—No doubt it will; and it is the intention not to do that. There is, of course, a great objection to any reservoir that is apt to be dry in summer. I have made notes as to the relative value of the reservoirs; I do not speak in the same terms of all. I suppose No. 1 is the best. I have not the slightest

doubt that that can be made,—in fact, I cannot conceive why anyone should question it at all,—and also the Hardwick one (No. 9), which I saw after writing my statement. It is a very good one, indeed.

Messrs. Woodward's Report and Evidence.

Dr. Henry Woodward, F.R.S., F.G.S., and Mr. Horace B. Woodward, F.G.S., made a report in which they said:—

No. 1. This reservoir would be situated in a broad valley, almost entirely on the Lower Lias clay, the bordering hills being composed of Middle and Upper Lias, capped by inferior Oolites. The lower beds of Middle Lias form the floor of the reservoir at its southern end, and the upper beds of Middle Lias and Upper Lias clay flank the reservoir by the dam. The general dip is towards the south. The site is a most suitable one.

No. 2. This is a ramifying valley in the inferior Oolite, with slopes capped in places by Fuller's earth, clay, and inferior Oolite. The bordering rocks are of a porous nature, although the slopes are coated in places by earthy rubble. Owing to the south-westerly dip of the strata, water cannot freely escape on the east, but a certain amount may flow away to the south-west into the Windrush drainage.

No. 3. This reservoir would be situated in a forked valley, based on the upper beds of the Middle Lias (marlstone) with clay slopes formed of Upper Lias. Lower Lias clay underlies the area, the general dip being to the south-east. Here the bottom of the valley, and to a certain extent the slopes are coated with clayey material, and the marlstone itself is likely to be water-logged.

No. 4. The bed of this reservoir would be on Lower Lias clay, and the sides would be mainly on the lower beds of the Middle Lias. No escape of water is to be apprehended.

No. 5. This reservoir would be situated in a valley formed of Lower Lias clay, with a central faulted tract of Middle and Upper Lias. It would be practically water-tight.

No. 6. This would occupy a valley mainly in the Lower Lias clay, with a portion of Upper Lias clay brought in by a fault. Traces of Northampton sands would be touched, but all escape of water would be shut off by a wing-trench.

Nos. 7 and 8. These would be entirely in the Great Oolite, the bottoms of the valleys being, however, covered by alluvium. Here the Great Oolite contains a considerable proportion of clay or marl, amounting to 25 per cent. of its mass, and the gentler slopes of the valleys are covered by a rubbly clay that serves to render them practically water-tight. Here and there, where old quarries have been worked, the banks would require to be puddled.

No. 9. The reservoir would be situated entirely on Kimmeridge clay, with only thin patches here and there of alluvial gravel. It would be perfectly water-tight.

Dr. Henry Woodward, in his examination, said that he and Mr. Horace Woodward had examined the sites of the nine reservoirs to see whether they were geologically feasible. They came to the conclusion that No. 1 was the most important site, and of undoubted suitability, as it could be made perfectly water-tight. There are in the neighbourhood several sites on which artificial lakes have been constructed. One is the Woodstock reservoir, covering 130 acres, built between 1720 and 1750, by Lancelot Brown. The Great Oolite forms the sides, and the bottom is alluvium with a substratum of Upper Lias clay. Other lakes rest upon the same Oolite beds. These contain here a larger proportion of impervious material than in the Cirencester and Bath areas, and consist of marly beds between limestones. Judging by the large proportion of clay to limestone in the valleys, there are two suitable for reservoirs that can be made watertight,—the Dorne and the Glyme (Nos. 7 and 8). These sites, being in the Great Oolite, would not have been looked at if it had not been for the existence of the Blethenim lake. It seemed that there was a large proportion of clay in the soil all round the lake, and that the clayey character of the Oolites rendered it water-tight. The "rubbly clay" covering the sides of the valleys is the result of the disintegration of the Oolite beds which are associated largely in that area with clay beds and marly beds. Water pressing against the face of these hillsides would not be liable to pass away.

Mr. Horace B. Woodward, examined by Sir A. Geikie, said the Windrush Reservoir (No. 1)

would practically be almost entirely on the Lower Lias clay. The dam would just touch the Upper Lias clay and the Middle Lias. The Lower Lias clay for 400 ft. is impervious, with an occasional nodule and band of limestone. The Middle Lias is very variable. In this area it is generally a thin rock bed, and underneath that thin sandy shales. Near Stroud the beds are used for brick-making. This is the only geological defect, and it can be remedied by wing trenches.

No. 2 reservoir has a floor of inferior Oolite, partly limestone and partly sand, with an alluvial deposit in the bottom of the valley. The sides are partly coated by rubble, but will not be so water-tight as any of the others; the strata are really more porous. Rubble is the rock that crumbles away in fragments from the sides of the hills mixed with loam. It is generally found on the side of a quarry. Earth and stone get mixed with it, and, being washed down the side of a valley, form a protective coating. The lower slopes are, in many places, quite impervious. This rubble is certainly impervious, but the whole area may not be covered by it. A certain amount of water would be likely to escape through the inferior Oolite, which is almost wholly limestone, but very porous in this particular part. The beds of limestone, from 6 in. to 2 ft. in thickness, are very porous and faulted. A certain amount of water would get away, and a certain amount would be retained, but he would not like to say what would be the relative proportions, so that his judgment on this site was not so favourable as on No. 1. The dip is so slight it would get away slowly, and a sufficient quantity would be retained to be of service.

No. 3, the witness said, is based mainly on the marlstone of the bordering hills and the Lias clay. The rocky bed would be 40 ft. thick, largely covered with alluvial coating, argillaceous, very impervious. The marlstone would be water-logged. The haiks would be absolutely water-tight. In the Upper Lias there are a few nodules of limestone. If a bed is 135 ft. thick, there would be over 100 ft. of clay and shale, impervious even in the lower parts, because the marly limestone is interstratified with clay. No. 3 would be all right because, the marlstone being water-logged, water would not get very far to the south-east. There is no risk of the water percolating the parts not covered with the alluvial and getting into the marlstone because the clay is carried well down into the Lower Lias. It would be 65 ft. down to the Lower Lias, and a puddle trench would require to be 65 ft. or 70 ft. deep. There must be some fissures, because we get water from the marlstone. The strata are flat and undisturbed, and there are no faults of consequence.

No. 4, having a floor of Lias clay, with sides of Middle Lias, would be satisfactory, almost as much so as No. 1. Of course you have more of the loamy beds in the Middle Lias, but they cannot be very leaky.

In No. 5 there is a central platform of marlstone which lies between two walls of clay. It is a case of faulting. Any leakage is cut off by the walls of clay on either side, and these make the reservoir practically water-tight.

No. 6 has a faulty floor of Lower Lias clay and Upper Lias clay, which are brought together. The dam runs across to the Northampton sand, but the wing trench would cut it off. The Upper Lias consists of shales and impervious clay. This is a favourable site.

Nos. 7 and 8 lie in the Great Oolite formation, 30 ft. of the upper part of which would be mainly very porous limestone. Beneath that alternate marl and limestone, inadequate to check water; but the reservoirs hardly touch these; they are mainly in the lower beds under these porous beds. The bottoms of the reservoirs would lie on the Great Oolite, floored with impervious alluvium. The rivers start up in the Upper Lias, and bring down blue mud which Mr. Marten has pointed out as useful in stopping any leakages in the reservoirs.

No. 9 is entirely in clay except for the possible trace of gravel. The clay merges into the Oxford clay, so that there are 500 or 600 feet of clay. There are no beds of alluvial gravel,—only little beds of gravel here and there. It is an absolutely water-tight site.

To Mr. Mansergh: In No. 3 the beds run fairly flat; the puddle-trench would have to be carried down nearly horizontal; and, presumably, it would have to go 140 ft. or 150 ft. deep in the shoulders.

To Mr. Hill: The information he had ob-

tained enabled him to form an opinion that the reservoirs would be retentive. The clay brought down makes the flood water turbid.

To the Chairman: The sites in themselves are good sites.

Professor Dawkins's Report and Evidence.

Professor W. Boyd Dawkins, F.R.S., in his report said:—

No. 1. This large reservoir is almost entirely on the impervious Lower Lias clay, the top water-line cutting to a small extent the Middle Lias and the Upper Lias clay. The puddle-trench has a perfectly good foundation in the Lower Lias clay. If there be leakage through the sandy beds of the Middle Lias, it can easily be stopped. It is, in my opinion, a very good site.

No. 2. This smaller reservoir is mainly on the Inferior Oolite, and the top water-line cuts the Midford sands and Fuller's earth. The puddle trench is to be carried down into the impervious Upper Lias clay. The leakage through the porous oolitic beds may be met by wing-trenches carried down also into the Upper Lias clay. The leakage on the east side will flow into No. 1 Reservoir. It may be made a useful auxiliary reservoir to No. 1.

No. 3. This reservoir, on the head-waters of the Cherwell, is wholly on the Middle Lias, which is partially covered by a surface wash of clay. The puddle-trench is to be carried down into the Lower Lias clay. If there be leakage it can be met by a wing-trench on the western side. On the east the covering of the Upper Lias clay shuts off the Middle Lias from the surface and renders leakage difficult if not impossible. The sandy beds of the Middle Lias are water-logged, and the Middle Lias at Edgecote, close by, is sufficiently water-tight to support a large pond.

Nos. 4, 5, and 6. These three reservoirs for the storage of the tributaries of the Cherwell are based on the Lower Lias clay, the top water-line cutting or touching the Middle Lias in all. In No. 4 the puddle-trench is to be based on the lower Lias clay. To prevent leakage, if necessary, a wing-trench can be made on the east side. In Nos. 5 and 6 the puddle-trench is to be carried down into the impervious Upper and Lower Lias clays, which are here faulted together. There is no chance of leakage because the valleys in which the reservoirs are to be placed are in faulted troughs bounded by the Lower Lias clay.

Nos. 7 and 8.—The reservoirs 7 and 8 are wholly on the great Oolite strata, consisting of massive pervious limestones and subordinate layers of marl, and with their outcrop at the surface largely covered by a clayey sub-soil. They are water-logged in the valley bottoms. The question as to whether reservoirs in the rocks can be made sufficiently watertight for storage purposes is conclusively answered in the affirmative by the practical experience of the great lake in Blenheim Park. The puddle trench in both these cases will be carried down, if necessary, into the Upper Lias clay. It is very likely, however, that a layer of marl sufficiently thick and watertight may be met with in the Oolites which will render this unnecessary.

No. 9. This reservoir is wholly on the impervious Kimmeridge clay, here covered with a thick and irregular coating of sand and loam.

Conclusion.—All these sites are practicable for the storage of the flood-waters, and the equalising of the flow of the Thames. They present no exceptional engineering difficulties. They are the only sites to which my attention has been directed. There are probably many other sites as good or better in the Valley of the Thames, which may be utilised in a similar way for increasing the water in the Thames available for the further supply of the metropolis.

In his examination, Professor Boyd Dawkins said that he was well acquainted with the district of the proposed reservoirs, and for this special purpose he had spent three or four days there. The reservoirs were the best that could be made under the difficult circumstances of the Upper Thames, and some of them seemed to be perfectly good and watertight reservoirs. No. 1 is a most excellent reservoir; it is a large one; the bottom is a perfectly good foundation; and there would not be very much difficulty from leakage. It would be shallow for a long distance in the upper part. The Lower Lias clay is an excellent, impervious foundation. How long the wing-trenches would require to be is a matter for experiment. No. 2 would not be a water-tight reservoir,

but the leakage through the porous Oolite beds may be met by wing-trenches. On the eastern side any leakage would flow into No. 1, and would not do any practical mischief. It is very probable the flow of the water would be arrested sufficiently to allow of No. 2 remaining full, but as to making it absolutely watertight he doubted whether that could be done. No. 3 may be made a fairly good working reservoir. He saw no difficulty in making it watertight, if the leakage proves to be considerable, he does not see why it should not be met by wing-trenches. Looking at the condition of the rocks there which are water-logged, and at the fact that there is a large pool on those very rocks not far off, he could not anticipate that long wing-trenches would be required, or that it might be necessary to surround the whole reservoir with a puddled trench. Nos. 7 and 8 look extremely doubtful from the map, and the known geological chamber of the oolites, but there is every reason to suppose that these reservoirs can be made to hold water at all events as well as the lake in Blenheim Park. That is very shallow in the upper part, but the lower part reaches a depth of 30 ft. If the head of water in the proposed reservoirs would be greater, so are the methods of dealing with it better than when that lake was made. No. 4 might be made to hold water. Asked to reconcile the statements of Mr. Woodward and Professor Green, he pointed to the map which showed the Lower Lias at the bottom, and said there could be no doubt that the foundation was Lower Lias clay. Nos. 5 and 6 may be made as nearly as possible absolutely watertight as any reservoir can be made. Professor Green's and Messrs. Woodward's opinions being read to him, the witness said the view of the latter was the accurate reading of the facts. No. 9, being wholly on the impervious Kimmeridge clay, there could be no doubt about it being a perfectly tight reservoir. His attention had been called to the reservoirs, and he did not wish it to be inferred that he had minutely examined the area of the Upper Thames, and that these were the only sites which he ventured to have an opinion upon.

The Commission stands adjourned to the 15th inst. Meantime, we have in type, and hold over for the present, the report and evidence given by Professor A. H. Green, F.R.S., on the "Nine Reservoirs Scheme," together with evidence given by Mr. Topley as to additional sites for storage reservoirs and as to a somewhat curious proposal by him for "slowly-leaking" reservoirs (with the view of compensating the land springs), and evidence by Sir Frederick Bramwell on chalk supplies.

Illustrations.

TRURO CATHEDRAL.*

THE Cathedral stands in the middle of the city, and as seen from the river it is a very striking object, towering up above the houses on all sides in the centre of the valley or basin in which the city is built.

It occupies the site of the ancient parish church, and spreads out beyond that site in every direction excepting towards the south, where one of the main streets forbids further extension.

In the design of this Cathedral Mr. Pearson has produced an adaptation of the English work of the thirteenth century, with some traces of foreign influence, and the whole stamped with the impress of his own individuality.

It is of the double cruciform plan, the narrow and lofty eastern transepts contrasting with the broader treatment of those of the crossing. It will have, when completed, all the features of our old English Cathedrals. Nave and aisles with south porch, western towers, western narthex, lofty transept with aisles, one of the southern of which, westward, is designed a circular baptistry, lofty crossing, with glazed lantern, open to the church, choir and aisles, eastern transepts, and—what is one of the features of the building—the old south aisle of St. Mary's Church connected with it on the south side by a lofty ambulatory. The chapter-house and cloister garth, with canons' residences, are designed to communicate with the

Cathedral on the north side, but these, of course, are still in abeyance.

With the exception of the nave, with its aisles and the western towers, the ground plan of the building is completed. As seen from the railway, the want of length in consequence of the absence of the nave is much felt, a from a nearer point of view the low temporary church and the long gable roof of the temporary west end are a miserable substitute for the west front, as represented in the complete design (also illustrated in this number from a drawing lent by Mr. Pearson, and exhibited in this year's Royal Academy), with its projecting gable and deeply-recessed circular window flanked by western towers of simple but carefully-studied design, and which will derive additional dignity by contrast with the more elaborated western narthex.

The nave as designed is 30 ft. wide, and its length is divided into four bays, each 28 ft. wide, again subdivided by slighter piers, so as to form an arcade of eight arches on either side; over them an open triforium, couple of clerestory windows, and sextariate vaulting. Abutting upon the main piers are flying buttresses over the aisle roofs. The aisles are lighted by an arcade of lancets separated by buttresses. The total height of the nave is about 70 ft.

The transepts at the crossing rise to the same height as the nave and choir; the southern one is like the west-end of the nave in so far as they both have large circular windows, but the treatment is totally different. Here the window is flanked on the west-side by a massive turret and on the east by a square Campanile rising with its pyramidal roof to a height of 140 ft. Below the rose window is a treatment of three lancets, and the enriched southern entrance, the gift of the late Canon Phillpotts. The gable-aisle and circular baptistry form a feature on the side as well as in. The northern arm of the transept has still another treatment of the rose window with here an arcade below it.

Proceeding eastward we pass the old aisle its continuous range of windows and panelled wall-surfaces contrasting with the more severe treatment of the cathedral. The choir has on each side five bays, little more than 12 ft. wide, with triforium and clerestory in character with those of the nave, but treated with a more delicate hand. East of these bays rise the eastern transepts, with angle turrets and a hold treatment of four lancets on the south side and coupled lancets on the north.

The east end is a treatment of three broad lancets in two tiers, with flanking buttresses terminating in open octagonal turrets, and with a traceried circle in the gable.

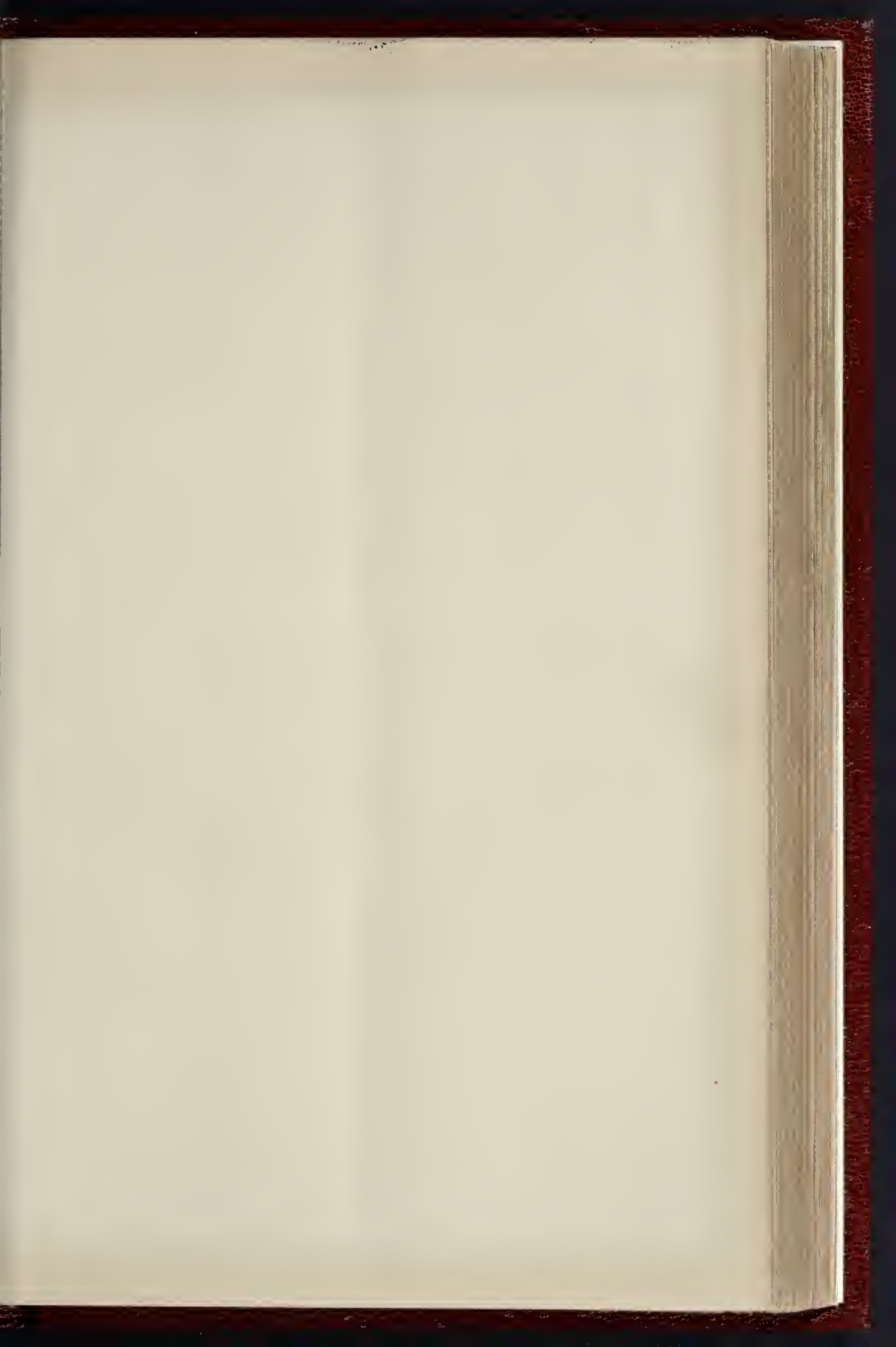
Entering by the south porch and standing under the western arch of the central tower, one is struck by the lofty proportions of the choir, with its tall arches, clustered shafts, enriched triforium, and recessed clerestory, terminating in simple quadripartite vaulting, while the rows of arcades, three in number, on the north side, give an effect of mystery and extent. The reredos extends across the choir, and is enriched with canopy-work and sculpture rising tier above tier, the crucifixion occupying the centre with a majesty above, and surrounded by Old Testament types of sacrifice. The altar is of wood, with a marble top, and is arcaded and decorated in gold and colour. The sanctuary is enclosed by side-screens of stone, richly canopied, and provided with sedilia on both the north and south sides.

Westward the choir is enclosed by screens of wrought iron. The choir floor is of marble mosaic, and contains some pieces of ancient porphyry. The stalls are of teak, without canopies, and they do not return at the west end, and as there is no western screen the choir is quite open to the nave. The Bishop's throne stands on the south side of the choir east of the stalls, with an enriched canopy, and simpler seats for chaplains on either side of it. In the centre between the stalls stands a large brass eagle, and next the north-east pier of the crossing is the pulpit, of considerable size, and enriched with sculpture.

The circular baptistry is raised three steps above the nave; the font, of red marble, stands in the centre of the circle, and has a canopied cover richly carved. The floor is in harmony with that of the choir. The groining springs from clustered shafts arranged around the wall, terminated in a centre boss.

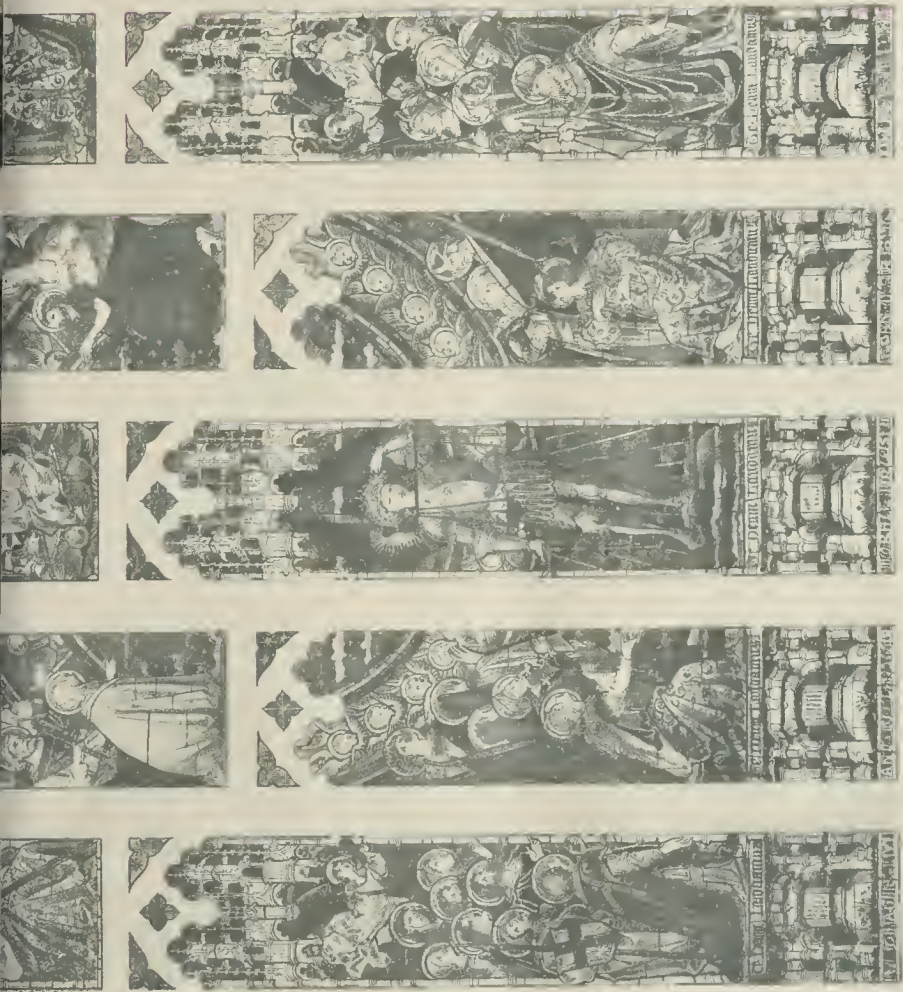
A scheme has been elaborated for the painted glass for the whole of the Cathedral. The east

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements, will be found on page 356.



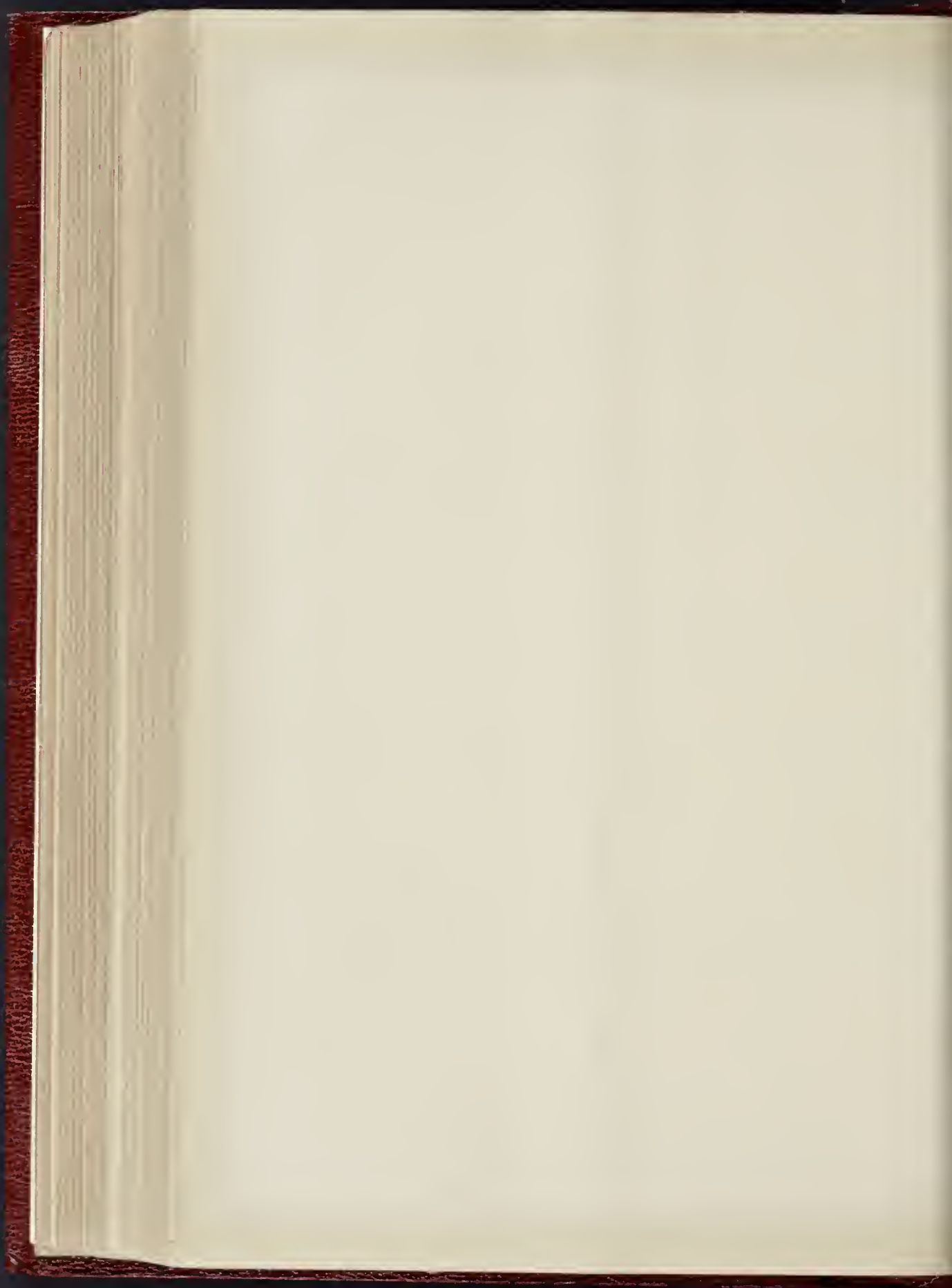
THE BUILDER NOVEMBER 5, 1892.

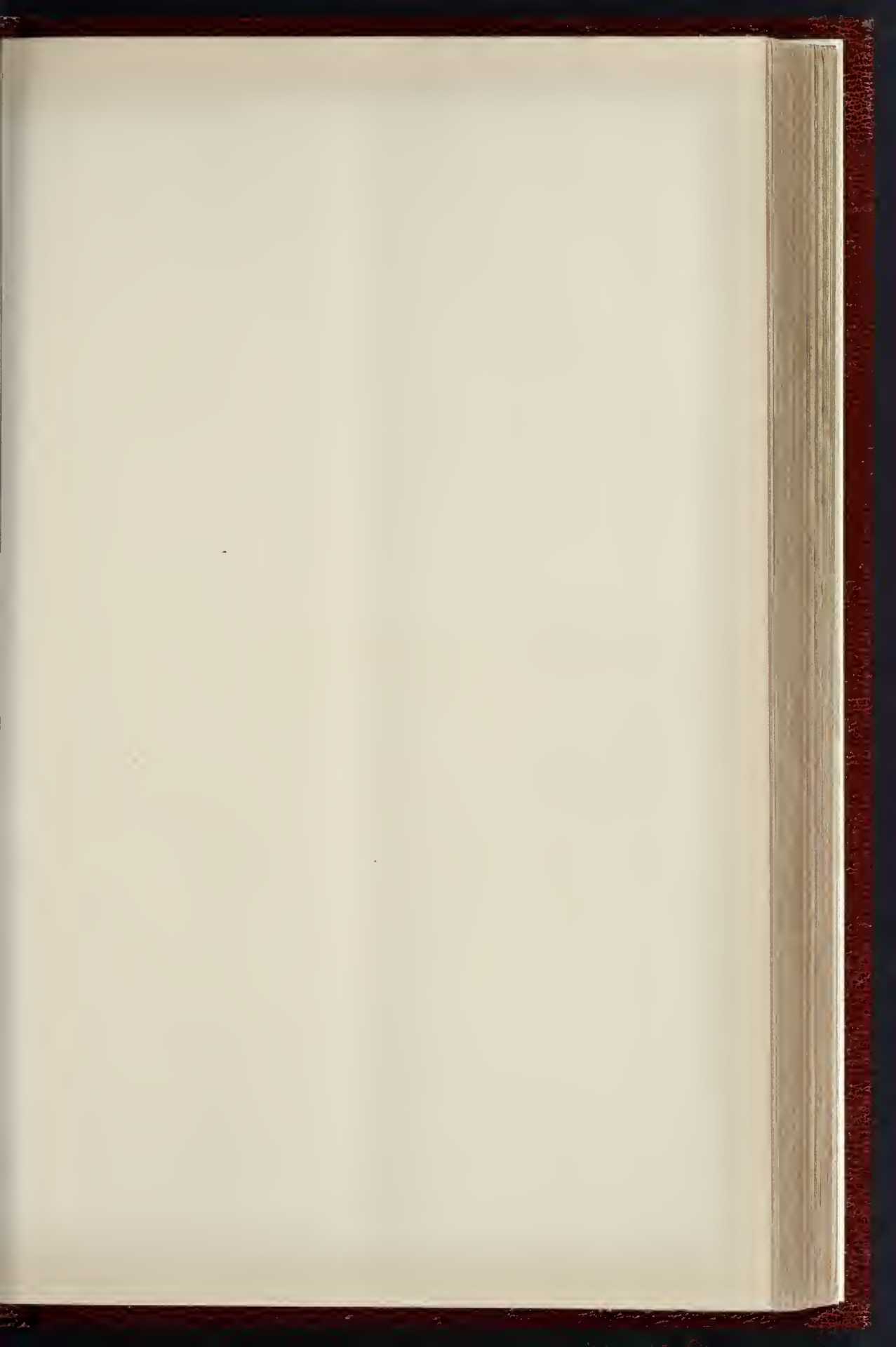




DESIGN FOR EAST WINDOW, ST. MARGARET'S CHURCH, LONDON. BY MR. EDWARD FRANKTON.

Royal Academy Exhibition, 1892.







Cathedrals of C
No. 24. TRURO: FROM THE SOUTHE

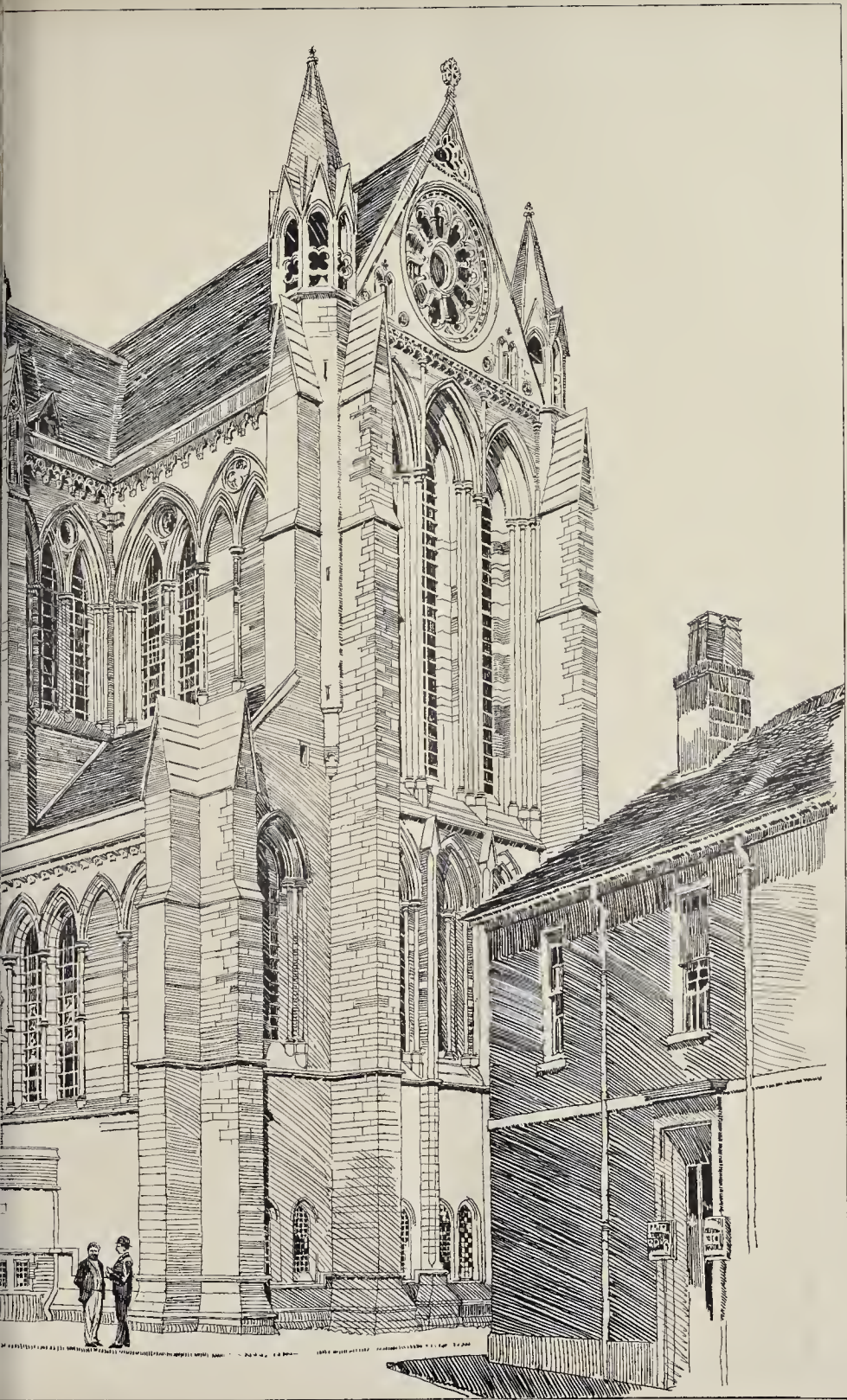


PHOTO-LITHO. SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

and Wales.
BY MR. A. N. PRENTICE, A.R.I.B.A.



ows, the rose windows of the transept, and canets under them, and several windows of choir, aisle, and baptistry have already been put in.

nder the choir is a groined crypt, which is level with the ground on the north side, and is considerable elevation. In it provision is made for a temporary chapter-house, vestries, singing school.

the view of the Cathedral as at present being, which forms one of the series of best illustrations, Mr. Prentice has, at our request, adopted a point of view which as much possible loses sight of the unfinished portions of the building, and gives a view of the eastern portion as it will always appear; the central part being the only uncompleted portion which comes into the view. The western towers, completed, would hardly show from this point of view.

We may mention that at the time of the design of the Cathedral we published (in the *Builder* for November 12, 1887) a long and full account of its architectural features and treatment.

DESIGN FOR EAST WINDOW, ST. MARGARET'S, LOWESTOFT.

THIS is a design by Mr. E. Frampton which was exhibited in the Royal Academy of this year. In regard to the general purport and treatment of the design Mr. Frampton writes: "The entire window illustrates the Te Deum. The tracery appears the 'nine orders of angels' expressed by their various emblems and costumes according to the authority of old as extant.

In the upper lights occur the figure of Our Lord, seated on a rainbow, crowned, and holding orb, expressive of power, and encircled by seraphs. This circle reaches the lower lights, and embraces the figure of St. Michael the change, who is the central figure in the lower light, standing, holding the scales and flaming sword of Justice and Retribution. The figure of Our Lord is surrounded by apostles and prophets, kneeling figures being those of the Virgin and St. John the Baptist. In the lower part, which illustrates the 'Holy Church,' are abbisshope, Bishops, martyrs, and saints. Canopy work is used sparingly, owing to the peculiar formation of the window, and architectural bases are introduced owing to the fact that at several already existing blocks out to at extent the lower portion of the window."

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon last, at Spring-gardens, the Chairman, Mr. John Hinton, presiding.

New Member.—Mr. R. B. Doake, the newly-elected member for North Kensington (vice Mr. F. C. Bann, resigned) took his seat.

The Proposed Building Department.—On the occasion for the reception of the report of the General Purposes Committee, Mr. Mercer asked the Chairman of that Committee what steps had been taken to carry out the recent resolution of the Council with regard to the establishment of a building department.

Mr. Benn, M.P., replied that the Committee had appointed a sub-committee to consider the question, and that sub-committee had already met, and a scheme had been laid before them, and it was found desirable to have legal opinion determine the Council's power in that direction. No time would be lost in carrying out the directions of the Council.

The Chief Officials of the Council.—The General Purposes Committee reported that the chemist to the Council asked to be allowed to revise the Corporation of Sheffield on a question connected with gas. In 1889 the Committee resolved that it was not expedient to comply with a similar request, and that was their opinion now. The view of the Council was that its officials should be solely and entirely at the Council's service, and, indeed, it seemed that the work of London was quite sufficient to require all their attention, and the Council agreed.

The Blackwall Tunnel.—The Bridges Committee presented a report the first paragraph of which was as follows:—

"We have received from Messrs. S. Pearson & Co., the contractors, a suggestion that certain portions of this work on the north and south sides of the river, which are specified to be constructed

under compressed air, could be much better and more cheaply executed by the method of cut-and-cover. The Engineer sees no objection to this as regards so much of the work on the south side of the river as extends south of shaft No. 4, and we have therefore sanctioned it. The Engineer believes that the work will be equally strong, and the contractors have agreed that the substitution shall be effected at a saving to the Council of 7,000*l.* The Engineer has also pointed out to us the advisability of lining the cast-iron work with a superior class of concrete instead of brickwork as specified, as he finds that there will be considerable difficulty in fitting in and building in the brickwork in a solid manner among the flanges and bolt-heads, some of which will project 10 in. into the concrete. He has also suggested that the whole tunnel should be faced internally with glazed tiles in preference to glazed-face bricks, as likely to form better work. He has also brought to our notice the advisability of forming a granite plinth where the glazed tiles or brickwork would meet the footway, and he states that an improved appearance on the other side of the tunnel would be produced by a polished granite moulding carried along the sides of the tunnel at a height of 8 ft. above the footway, the sides for this height being carried vertical. We have sanctioned these modifications, which, when the saving by the use of concrete as compared with brickwork is taken into account, will entail for the whole work an increased cost of 14,000*l.*, one-half of which, it will be noticed, will be saved by the substitution of cut-and-cover for compressed-air work on the south side of the river. We have not to ask the Council for any further expenditure in respect of these alterations, as a sum of 50,000*l.* has been included in the estimate and contract to cover such modifications as the work proceeds. We therefore recommend:—

"That the decision of the Committee be approved."

A long discussion took place on this recommendation, considerable diversity of opinion being expressed as to the relative merits of enamelled bricks and glazed tiles for facing the tunnel.

Mr. Lloyd moved, and Mr. Stevens seconded, the following amendment:—

"That the opinion of Sir B. Baker and Mr. Greathead, as consulting engineers, be taken before any proposed important changes in the construction of the Blackwall Tunnel are sanctioned."

On a division, the amendment was carried by 74 votes to 41.

Mr. Marsland moved, as a further amendment:—

"That the whole question of the alterations specified in the report be referred back to the Committee, with instructions to reconsider it and bring up a further report to the Council."

This amendment was seconded by Mr. Hoare, and carried by a large majority.

Tenders, Barking-road Bridge.—The same Committee reported on this subject in the following terms:—

"We have considered the tenders for the reconstruction of this bridge which were referred to us by the Council on September 27.* On an examination of the tenders, it was found that all the firms had not filled in the schedule of wages to be paid to the men who will have to be employed on the work. We accordingly asked each firm to state whether they would be prepared to adopt the rates of wages and hours of labour as fixed by the various Trades Unions concerned. The Thames Iron Works and Ship-building Company, whose tender is the lowest, stated in reply that they were prepared to do so, but that it would necessitate an increase in their tender by the sum of 5,750*l.* The Company also stated that in the event of the Council not being able to furnish them with a site adequate for the purposes of their work, a further sum of 1,600*l.* would have to be added. The Council has some surplus lands at Barking-road Bridge which might be used by the Company. We therefore directed negotiations to be entered into with the object of the Company reducing their tender by the amount named, the Company being allowed the use of the Council's land. On inquiry it was found that the ground was not sufficient for all the purposes required, but the Company agreed to reduce the 1,600*l.* by 750*l.*, thus making the amount of their tender 54,353*l.* Notwithstanding that the Company's tender has been increased by the two sums named, it yet remains the lowest. A question was raised by the Company with regard to clause 47 of their tender, which makes the Engineer of the Council the sole arbitrator. The Company are quite prepared to accept Mr. Binnie as the arbitrator, but in the event of his being unable to act they desire that the President of the Institution of Civil Engineers should appoint an arbitrator instead of the Council. As there does not appear to be any objection to the request of the Company we have concurred the point. We recommend:—

"That, subject to an estimate being submitted by the Council by the Finance Committee as required by the

* For list, see *Builder* for October 1, p. 271.

statute, the amended tender of the Thames Iron Works and Ship-building Company, Limited, amounting to 54,353*l.*, be accepted, and that the solicitor be instructed to complete the contract."

Mr. Arnold moved that the recommendation be referred back to the Committee, with an instruction to report particulars of the original and the amended tender of the Thames Iron Works and Ship-building Company.

The amendment was negatived, and the recommendation of the Committee agreed to.

The Height of Hoardings Enclosing Vacant Land.—The Building Act Committee reported as follows on this subject:—

"Our attention has on several occasions been directed to the many high, dangerous, and unsightly hoardings erected round vacant land in the county, and used for advertisement purposes. We have received deputations from the London Bill-posters' Protection Association, and from the London and Provincial Bill-posters and Hoarding-builders Society, with reference to these erections; and, after a careful consideration of the whole subject, recommend that the following regulations be approved and enforced by the Council in the future:—

(a) That no existing hoardings be increased in height so as to exceed 9 ft.

(b) That no new hoardings be erected exceeding 9 ft. in height.

(c) That existing hoardings exceeding 15 ft. in height be reduced to that height within six months of notice given."

Mr. Ranyard moved, as an amendment, that 15 ft. be the maximum height of the hoardings, any undue interference with which he deprecated, on the ground that the pictorial advertisements thereon displayed formed a popular picture-gallery. "Beautiful pictures some of them are," he added. He urged that to cut down the hoardings too much would be to throw a number of bill-stickers out of work.

Mr. Yates seconded the amendment.

Mr. Burns, M.P., supported the recommendation of the Committee, and said that he differed from some of his friends the "labour members" on this question, which was one which ought to be looked at by the Council as a municipal authority responsible for the architectural homogeneity of our streets." He advocated a municipal tax upon posters, as in Paris.

On a show of hands being taken, the amendment was declared carried; but on a division being demanded, the amendment was lost, 52 voting for it, to 56 against.

Mr. Emden moved, as a further amendment, that the height of each hoarding should be limited to 12 ft.

This amendment was seconded by Mr. Cornwall, and was carried by show of hands, and a division being demanded, the amendment was declared carried by 57 to 47.

Proposed New Fire Brigade Station at New Cross.—The Fire Brigade Committee presented a report recommending that tenders be invited for the erection of a new Fire Brigade station at New Cross.

Mr. Thornton moved, and Mr. Stockbridge seconded, the following amendment:—

"That the fire-station at New Cross be erected by the Council by the direct employment of its own labour, and that it be referred back to the Fire Brigade Committee to give effect to this resolution."

On a show of hands, only six members voted for the amendment, and the recommendation of the Committee was therefore agreed to.

Proposed Electric Lighting on the Victoria Embankment.—The Highways Committee presented a report recommending:—

"That it be referred to the Parliamentary Committee to take the necessary measures to obtain the sanction of Parliament in the next session to the carrying out of the electric light installation on the Victoria Embankment and the park and gardens, and the Westminster and Waterloo Bridges, referred to in a resolution of the Council of June 25, 1892."

The recommendation was agreed to, and after transacting other business, the Council adjourned at a quarter-past seven.

NEW CHURCH, GRANTULY.—On the 12th ult. the foundation stone was laid of the new church which is being erected at Grantully by Lady Stewart in memory of her late husband, Sir A. Douglas Stewart, Bart., of Grantully. The new building is in the Gothic style, and was designed by Mr. W. Bell, C.E., Aberfeldy. It is 74 ft. long and 26 ft. 6 in. wide, and is to afford accommodation for 200 sitters. There is an apse at the east end, and a small vestry at the north-east corner. The main entrance is in the south side. The church is built of native whinstone, the heavy-work dressings being taken from Gellyburn Quarry, on the Murlty property. The slates also come from Birnam. A memorial-window is to be placed in the west gable. The cost of the building is estimated at about 2,000*l.*

BIRMINGHAM ARCHITECTURAL ASSOCIATION.

THE new session of this Association opened with a well attended meeting on the 1st inst., at which the President, Mr. W. Hale, F.R.I.B.A., delivered the annual presidential address to the members. He congratulated the members upon the steadily increasing numbers and on the improved position of the Association, and expressed the hope that its work would, as it became more widely known, induce the members of the profession to give cordial support. Referring to the past session's work Mr. Hale pointed out that the most notable thing accomplished was the arrangement with the School of Art, whereby the architectural work had, while still remaining under the control of the able masters who have in the past conducted it, been supplemented and concentrated into a definite course of architectural study, extending over a four years' course, a course which it was believed would, with the addition of the Association classes, prove to be a very valuable one, and which it was hoped would in time be extended into a very complete one. Mr. Hale expressed the opinion that there was great reason for congratulation in the facts that so able a lecturer as Mr. Bidlake had been found in the Association to undertake the special lectures on Architectural Design, and that his lectures had been so well attended. Mr. Hale also said that, though it had been found impossible for the Association to do more this session than carry on the Classes of Design and Construction, it was the wish of the Council to see other special classes started in future sessions. In concluding his address, Mr. Hale gave many valuable hints to the student members as to methods of work, and expressed the hope that practising members would encourage their assistants and pupils to join the School of Art Association classes. A hearty vote of thanks to Mr. Hale for his address (proposed by Mr. Doniheday, and seconded by Mr. McConnal) was unanimously passed, after receiving the support of Mr. Peacock, who reminded the members that the connexion with the School of Art was due in a large measure to the work of Mr. Hale. Among the other members who spoke in support of the resolution were Mr. W. Henman, Mr. H. R. Lloyd, and Mr. C. E. Bate-man. A brief response from Mr. Hale brought the proceedings to a close.

WORKING RULES FOR THE BUILDING TRADES OF LONDON.

THE following are the new working rules for the building trade in London, which will come into force on the 7th inst.:-

Working Rules for all Trades except Plumbers.

1. That the working hours in summer shall be fifty per week.
2. That during fourteen weeks of winter, commencing on the first Monday in November, the time shall be worked for the first three weeks eight and a half hours per day; during the eight middle weeks eight hours per day; and the three following weeks eight and a half hours per day.
3. That the present rate of wages for skilled mechanics and labourers shall be advanced one half-penny per hour.
4. That overtime when worked at the request of employers, but not otherwise, shall be paid at the following rates, namely:-From leaving-off time until 8 p.m., time and a quarter; from 8 p.m. to 10 p.m., time and a half; after 10 p.m. double time. No overtime shall be reckoned until each full day has been made, except where time is lost by stress of weather. On Saturdays the pay for overtime, from noon to 4 p.m., shall be time and a half; and after 4 p.m., and on Sundays, double time. Christmas Day and Good Friday shall be paid for the same as Sundays.
5. That employers shall give one hour's notice or pay one hour's time, on determining an engagement. All wages due shall be paid at the expiration of such notice, or walking time if sent to yard.
6. That men who are sent from the shop or job including those engaged in London, and sent to the country, shall be allowed as expenses 6d. per day for any distance over six miles from the shop or job; exclusive of travelling expenses, time occupied in travelling, and lodging money.
7. That payment of wages shall commence

at noon, or as soon thereafter as practicable, on Saturdays, and be paid on the job. But if otherwise arranged, walking time at the rate of three miles per hour shall be allowed to get to the pay-table at twelve noon.

8. That employers shall provide, where practicable and reasonable, a suitable place for the workmen to have their meals on the works, with a labourer to assist in preparing them.

9. That wages earned after leaving-off time on Fridays and Saturdays only shall be kept in hand as hack time.

10. That the term "London district" shall mean twelve miles radius from Charing-cross.

11. That six months' notice, on either side, shall terminate the foregoing rules, to expire on May 1. The foregoing rules shall come into force on the first Monday in November, 1892, but the increase of pay to bricklayers shall commence from the first week in July.

Working Hours for all Trades except Plumbers, For Fourteen Winter Weeks.

For Three Weeks commencing the First Monday in November:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4.30 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 47 hours per week.

For the next Eight Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 44½ hours per week.

For the following Three Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 12.30 p.m. to 4.30 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 47 hours per week.

For Thirty-eight Summer Weeks.

First five days of each week, 6.30 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 5 p.m.
Saturdays, 6.30 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to fifty hours per week.

Masons and joiners in shops to have one hour for dinner all the year round, and work half an hour later than the time specified for the winter months, thus making the same number of hours as worked outside on jobs, namely, as laid down in Rule 2.

Carpenters and joiners who are in receipt of full wages, and who have been employed for two hours less than the hours mentioned above, shall, on discharge, receive one hour's notice, to be occupied, so far as practicable, in grinding tools, with one hour's pay in addition.

Working Rules for Plumbers.

1. That the working hours in summer shall be forty-seven hours per week.
2. That during fourteen weeks of winter, commencing on the first Monday in November, the time shall be, for the first and last three weeks, forty-four and a half hours, during the eight middle weeks forty-two hours per week, in all cases where the other trades cease work at 4 p.m.
3. That the present rate of wages for skilled plumbers shall be advanced one half-penny per hour from the first Monday in November, 1892.
4. Payment for overtime and all other rules to remain in force as at present.

Working Hours, &c., for Plumbers.

For Fourteen Winter Weeks.
For Three Weeks commencing the First Monday in November:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4.30 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 44½ hours per week.

For the next Eight Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 42 hours per week.

For the following Three Weeks:

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 4.30 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 44½ hours per week.

For Thirty-eight Summer Weeks.

First five days of each week, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon, 1 p.m. to 5 p.m.
Saturdays, 7 a.m. to 8 a.m., 8.30 a.m. to 12 noon.
Equal to 47 hours per week.

Overtime.—Plumbers being required to work overtime shall receive, from 8 p.m. to 11 p.m. time and a half; from 11 p.m. to 7 a.m. double time, Saturdays, from 1 p.m. to 5 p.m. time and a half; from 5 p.m. to 7 a.m. (Monday) double time. Sundays double time. Any plumber being discharged shall receive one hour's notice.

District and Expenses.—For plumbers, the term "London District" shall mean six miles radius

from Charing Cross; and any skilled plumber sent to work over four miles from his employer's workshop shall receive all travelling expenses. If he goes over eight miles from his employer's workshop, he shall be entitled to one shilling per day extra, with the usual allowance for lodgings, and all travelling expenses. Should there be no accommodation for him to reach his work at 7 a.m., he shall be entitled to one shilling per day, unless he travel the employer's time and be paid from 7 a.m.

All other rules to remain as at present in force. Issued by the Central Association of Master Builders of London, 31 and 32, Bedford street, Strand.

Books.

Excavations of the American School of Athens at the Heraion of Argos, 1892. By CHARLES WALDSTEIN. London and Berlin: Ascher & Co.

DR. WALDSTEIN'S work at Argos began on February 15 of the present year, and no one can tax him with undue reticence as regards its results, when after the lapse of little over eight months he gives to the public his preliminary report, accompanied by eight prototype plates. We have so repeatedly urged on archaeologists the duty of prompt publication (a thing quite distinct from hurried interpretation), that we are glad to see Dr. Waldstein set an example so admirable. The twenty pages of text that accompany the plates do not pretend to anything like complete exegesis, the "rich harvest of material brought to light," says Dr. Waldstein, "extending over so many periods of Greek life and entering into every department of archaeological science, call for elaboration which, in anything like a final shape, will occupy the student for several years."

As we have already some time back briefly summarised the course and extent of the excavations, we proceed direct to such material as will be new to our readers. And first, in turning over the plates, we come (plate vii.) on a small archaeological fragment which has a familiar look and carries the memory back to the Erechtheion at Athens—we mean a fragment of the cyma of the Heraion. The ornament upon this consisted of "two volutes joining, out of the junctions of which rises an anthemion in modified lotos pattern. The volutes end on either side in the honeysuckle pattern, below which one smaller curved line sweeps inward, and ends in a smaller volute beside the anthemion;" but the noticeable feature is yet to come: "Each smaller volute is surmounted by a bird." So far as we remember, this bird appears elsewhere only on the Erechtheion cyma, in a fragment that used to be near the entrance-gate to the Acropolis, and, if our memory does not deceive us, another slah with a bird lies in the Museum at Argos, and no doubt came from the Heraion. A photograph of the Athens fragment lies before us, and, — *pace* Dr. Waldstein,—is much superior to the Argos work. There are some minor differences, the ornament is grouped more closely in the Athens fragment, the bird less elongated, the whole thing looks stronger, and, to our minds, earlier; the curves in the anthemion are downwards and inwards in the Athens fragment, upwards and outwards in the Argos one.

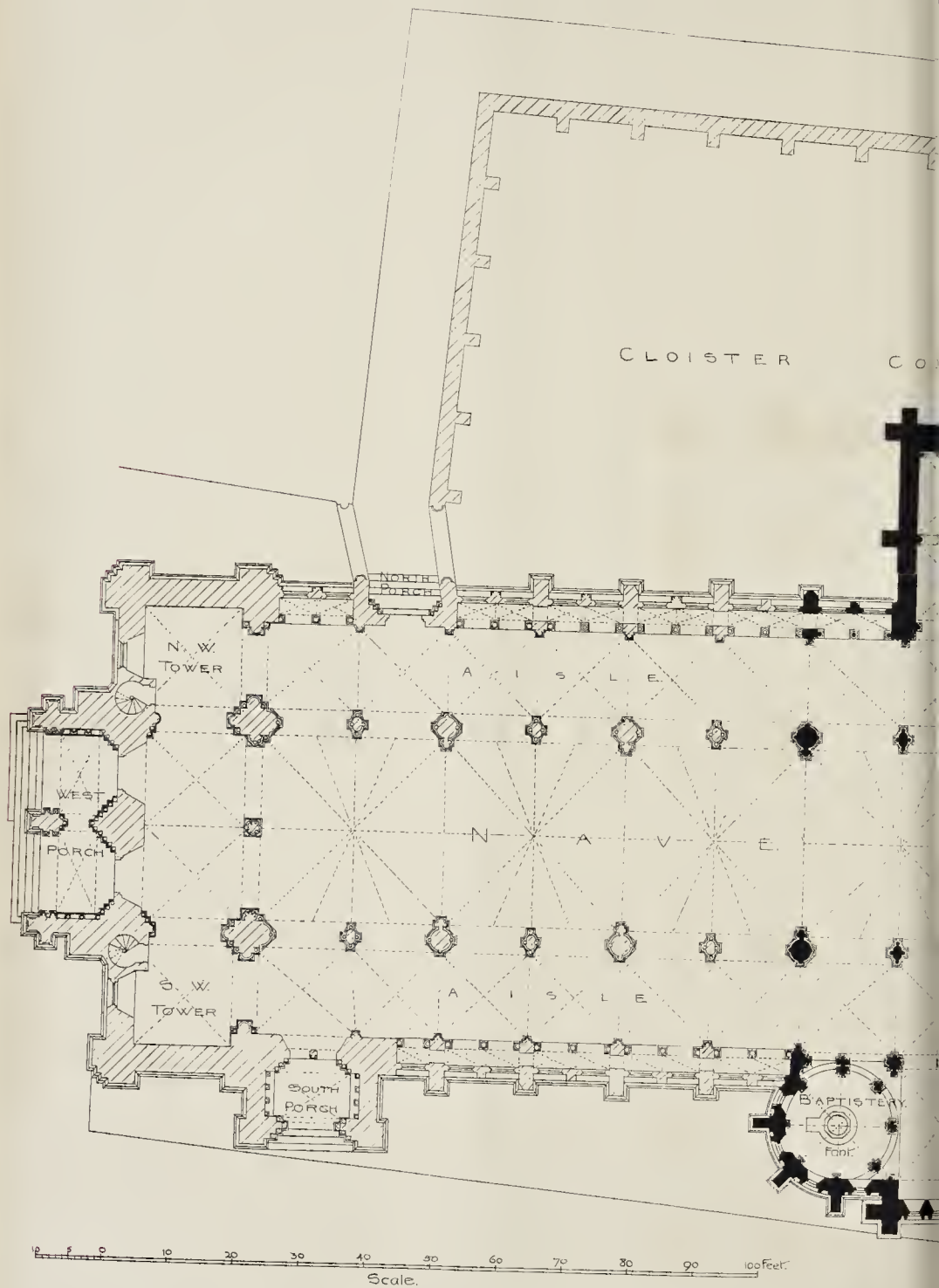
Besides the cyma fragment in plate vii. are published of architectural fragments, two lions' heads, once adixed to the cyma. Dr. Waldstein compares these carefully with those of the Parthenon, of the older temple of Asklepios at Epidaurus, of the Tholos at Epidaurus, and of the mansoleum at Halicarnassus; those of the Parthenon, though much softer in the modelling of the head generally, is simpler in the treatment of the mane and in the modelling of the lips. The nearest analogy to the Heraion lions appears to be in those from the older (fifth century B.C.) temple of Asklepios at Epidaurus, while those of the Tholos, now attributed to the younger (fourth century B.C.) Polykleitos, are markedly much more realistic.

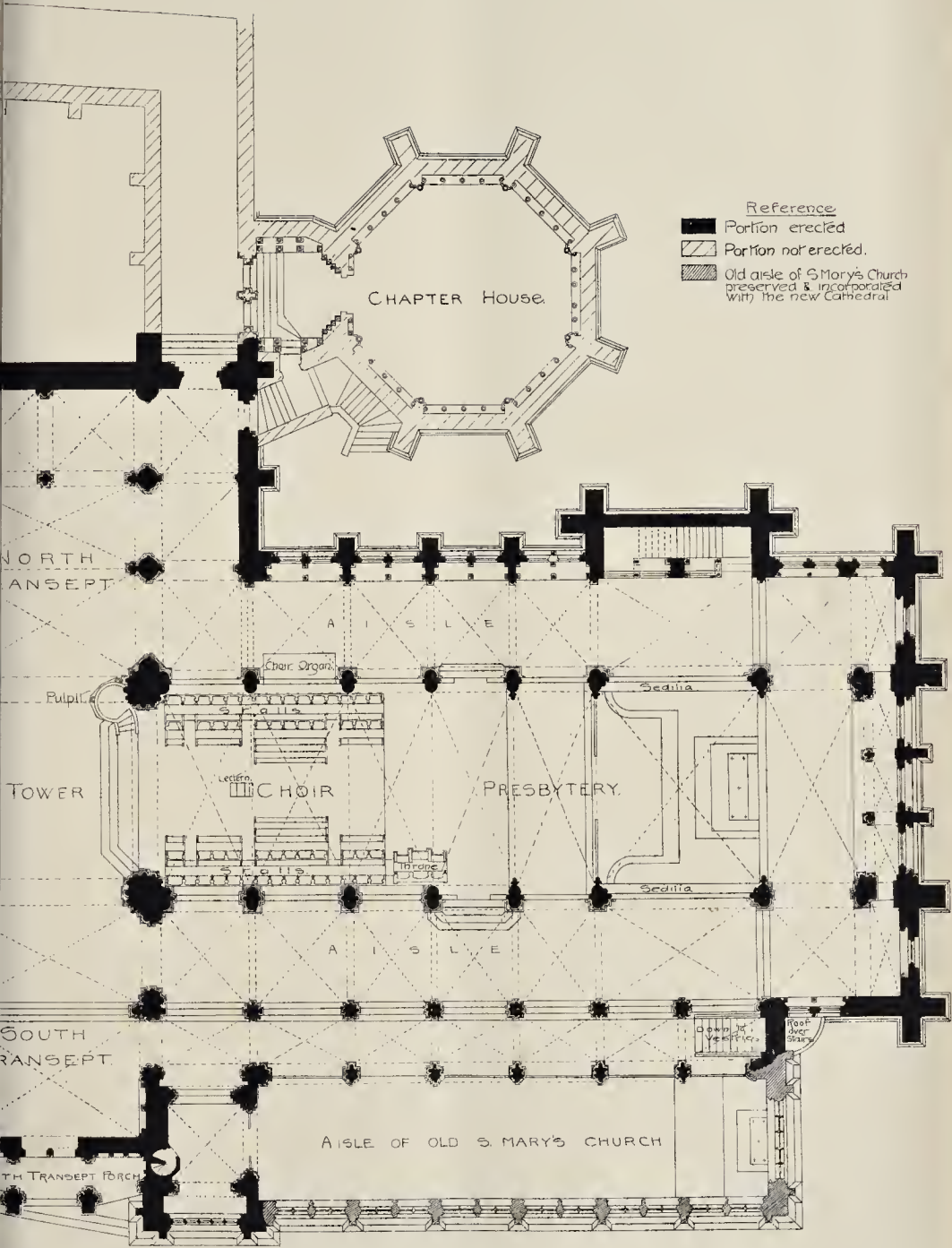
It is in the careful examination of such details as treatment of hair, eyes, eyelids, lips, for the dating of style, that Dr. Waldstein excels; and, indeed, it is the only secure method. He applies it with the utmost care to the head of Hera, which he holds, and we think rightly to be "a representation of the Argive school of the second half of the fifth century, and as such to hold some relation to the work of Polykleitos, who established the



TRURO CATHEDRAL.

GROUND PLAN.





Mr John. L. Pearson R.A.
Architect.



type of Hera in this temple." But Dr. Stein's analysis can only profitably be followed standing close to the head itself, a cast of which he has presented to the Fitzwilliam Museum. The terra-cotta figurines, votive for the most part, are chiefly of interest in connection with mythology, the important finds of which to which we may look for light on the "pans" question could not adequately be treated at such short notice; they are reserved for a second issue to be hoped for in spring.

Griechische Götterideale in ihren Formen edited by HEINRICH BRUNN. München, 13. Verlagsanstalt für Kunst & Wissenschaft-Normals, F. Brückmann.

This book is an interesting collection of results, dating from as early as 1836. As the results thus gathered together are scattered and wide in foreign "transactions," they are welcome, perhaps more to artists and lovers than even to archaeologists. The paper is devoted to the Hera Farnese,—a subject to which new interest attaches now in connection with Dr. Waldstein's discovery of a "Hera" at Argos. Other papers deal with the Demeter of Cnidus, the Hypanos of the British Museum, the Asklepios of Melos. There is in this common, that they attempt, by a minute analysis of details, to fix the characteristics of the Greek "ideals of the gods," but, necessarily, the series lays no claim to completeness. So far as it goes, however, the book is pleasant reading, and made the more enjoyable by the beautiful autotype plates in which it is illustrated.

Die antiken Kultstätten auf Kypros. Mit 18 Tafeln. Leipziger Doktor-dissertation XI.

English version of this valuable dissertation appeared, but it is printed only for private circulation,—"English" we say for want of a precise terminology, "English as she is" among German doctors would be nearer the mark. For this reason, as well as that the pamphlet is privately printed, we draw attention to the German version, which is less unassailable reading. But, form apart, the dissertation is one of which the English educated public cannot afford to be ignorant. Cyprus is a field we have now made our own, in a sense. Dr. Richter, in his introduction, gives an account, personal and pathetic, of his long preliminary struggles, which have resulted in the determination of no less than seventy-two sites of ancient seats of worship in the island, a panorama of which is given in an admirable map, reproduced from that too short-lived periodical, the *Zeitschrift*. Further, a practically new chapter in the history of Greek art has been written. The exposition of his views Dr. Richter reserves for the publication of his great work, *Die Tempel, die Bibel, und Cypros*, a high-sounding title well-calculated to "draw" an English and American public; the present dissertation is to form one of the chapters in this treatise. "If," says Dr. Richter, "the upper, bronze, and iron periods are definitely established for Cyprus, we need not be surprised if that the manners, customs, weapons, vessels, and apparatus of worship pictured in the Bible and in the Homeric poems are more fully illustrated by discoveries made in Cyprus than by anything which has been observed elsewhere." He promises in this coming volume to only to throw light on Troy, Mycenae, and Olympia, but also, by the help of Cyprian monuments, to explain "a long series of the best passages in the Bible, even whole paragraphs and chapters." The book, when it appears in English dress, is sure to excite much attention, and no small controversy.

The Timber and Wood-Consuming Trades' Directory. London: *Timber Trades' Journal* Office, 11, Bartholomew-close, E.C.

This is a very useful publication, first issued many years ago. The new edition has been revised and corrected up to date, and, having in its back the staff of the *Timber Trades' Journal*, great facilities for correctness and accuracy of information on special trade matters have been available, and have been fully used. The directory contains classified lists of firms in the United Kingdom engaged in the foreign, colonial, and home timber, shogony, and hard-wood trades, and the

principal wood-consuming industries; also the names of exporters of timber in the various timber-producing countries, and the Continental and Colonial importers of timber. It contains several maps and plans of timber-docks, &c., and is bound between boards of "Jarrahdale" Jarrah, an Australian wood possessing several useful qualities.

Correspondence.

To the Editor of THE BUILDER.

"ARCHITECTURE A PROFESSION OR AN ART."

SIR,—I have read the recently-published thirteen essays under the above heading, and your review of same, in which you so admirably sum up the various points under discussion.

The "Memorialists" have done good service in placing before the public the high objects and aims of our calling, and we of the craft cannot but be grateful for the manifest sincerity and enthusiasm with which they, one and all, insist upon the nobility of architecture as an art, and the devotion which it demands from those who practise it. I find myself, for the most part, cordially in sympathy with their views on the education of architects and their insistence upon the wisdom of alliance with the arts and crafts, without which architecture is shorn of her proper adornment. With you, Sir, we must deplore that, with so much that is well and ably expressed, there is so much that would have been better left out.

The contemptuous manner in which the Institute and its members are spoken of is scarcely courteous or in good taste. Those who are acquainted with the facts know that in the ranks of the Institute are many men every bit as eminent as those who are outside and seek to degrade it; and among those who are now dead, men whose works live after them, who, whilst living, showed by their actions that they had aims beyond their own practice, and endeavoured, in concert with their fellows, to raise their art, help others, and not to stand aloof and study each his own interest solely.

The system of examinations established under the new Charter is not the work of to-day. For many years the subject has been under discussion and partial experiment. Now it is fairly on its trial, and the response which the younger men have made to the invitation is most encouraging, save that of achieving success, given themselves to the establishment of these examinations.

I observe that the "Memorialists" generally admit the possibility of testing a student's knowledge on the Science side, but altogether deny it on the Art side. No doubt there are difficulties in the way; but they are not insurmountable, as witness the competition for prizes at the R.A., the Institute, the A.A., S.K.M., and other bodies. If these and the competition for public buildings, in which these gentlemen themselves compete, are not in the nature of examinations, then words have no meaning.

It seems to be taken for granted by the "Memorialists" that you cannot examine in architecture; that the system, if once firmly established, will so cramp the men who enter the profession that only the most dire results and the eventual destruction of the art may tearfully be looked for. Admission to all other professions is now by examination, whether we like it or not. Does it destroy or cramp the powers of the members of them?

You cannot examine a candidate for holy orders in his spiritual gifts; the lawyer in eloquence, tact, or shrewdness; the doctor in those special qualities which make the successful practitioner; the soldier in bravery and ready use of resource; the sailor in what he will do when facing the dangers of the ocean. Such qualities can only after experience be brought to the test. All that examination can do is to insist upon a certain standard of excellence, and to set before the student an object to work for, a goal for him to reach. If instead of cavilling, the essayists had taken the trouble to make themselves acquainted with the good which has been done, and the advantages which our students have gained and many times owned to, it is to be hoped we should have had less of this uncharitable writing.

Several of the authors of these essays are hard upon the men who practise as architects

and surveyors. With them, to touch anything outside building and its adornment is the unclean thing. Many who practise in both capacities would doubtless, were they to consult their own inclinations, be only too happy to follow the tempting side of their profession; and they have to live, despite the remark quoted of the cynical Frenchman, "Monsieur, je n'en vois pas la nécessité!" and they have a right to live and to take as they please any work that is legitimate and honest and in their ken to perform. With an assured income, outside one's profession, it is easy to wait in your office until the desired plums drop; but we are but mortal, and, without extraneous sources, cannot exist on a glass of water and a tooth-pick.

One would very much like to know what our brethren in the provinces think of these transcendental views of an architect's calling. Mr. Jackson and his friends will, perhaps, admit that there are competent men amongst them, and that it is not necessary, when a building has to be erected, to send to London to secure the services of those who never touch surveying. Every country practitioner, I take it, is glad to land every fish which comes to his net, and does not trouble himself as to where the diverging lines betwixt architecture and surveying commence or leave off. They have probably some very good reasons to give why they should exist, and may in their turn ask some awkward questions.

That the system of examinations as now carried on at the Institute is perfect, the most ardent supporter will probably not assert: it has hardly had a sufficient trial. As time goes on, the weak places will be strengthened, and experience will point out where new departures are needed.

I cannot close this letter without saying how unfair, in my opinion, is the interpretation placed so many of these writers put upon Mr. Macvicar Anderson's remarks upon the qualifications of an architect. Mr. Norman Shaw was the first to fall into this error, and the others have followed him. No one reading what Mr. Anderson *did* say, and the meaning put upon it, will, I think, consider it just. This, and much else in the book are evidences of a weak case, and of faulty arguments. Whilst the men who now attack the Institute have been standing by, doing little or nothing for any one but themselves, the Institute has, perceiving the needs of the times and the drift of events, displayed increased energy. Had these gentlemen entered the Institute (where they would have been welcomed), they might have helped to shape its policy and lent their counsels to its guidance; they chose to turn the cold shoulder. What now do they hope to achieve? COLE A. ADAMS.

SIR,—An admirable article in the *Builder* of October 22, fair in appreciating the honest belief,—or rather doubts,—of the "Memorialist" brethren, judicial in the exposure of some inconsequent reasoning, has done something to steady the mind of one exercised by some uneasy doubts.

I am one loyal to the policy of the Institute, and with a conviction that its tendency is right on the vexed "Examination" question; but I have still the uneasiness of one wrestling with a religious doubt,—are we all right, or the "Memorialist" persuasion altogether wrong?

An architect is born, not made, say this persuasion in effect. Well, not altogether made, but partly made, say other reasonable men. Cannot we go so far as to frankly admit the perfect architect is past finding out and hall-marking by examination test?

Yet is not the Institute on right lines in bringing "into its Fellowship,"—in the simple English sense of community,—those who have been proved by some examinative test, or, by their works, to have acquired a liberal education and the technical knowledge and practical experience without which any man offering himself for the community of architects is a fraud and a pretender.

Somehow I feel with the Memorialists we must go higher than this, and I go with my friend Mr. Bishill that we cannot elevate the Fellowship of the Institute into a title of distinction. Why should we, when in the simple or original intent of the word it means nothing of the kind?

Are there not men, such as Mr. Norman Shaw and Mr. T. G. Jackson and other malcontenta, at whose honoured names we instinctively bow when we meet them and say "Master!" May

it not be in this instinctive recognition of the Master Architect by the community of the Institute, and by the wide suffrage of its members, that the true distinction of architect in its highest sense may be found, always provided that by the tests of the Institute he has been found to be an educated one?

For practical purpose of distinction I would affix to the name of the architect pronounced by the suffrage of his fellows to be a master in architecture the letter M., thus:—

NORMAN SHAW, M., F.R.I.B.A.

I think that looks well. Could such a man object to such a distinction? Look at the pull we should have over these worthy and able theorists whom we know to be masters in architecture indeed, and yet who stand apart from our Fellowship. We could confer the distinction on them *whether they liked it or not*.^{*} The architects of this free country are free to hold and express a free opinion as to whom among them are masters of their craft.

And I believe such distinction would not be disliked. I cannot believe that there is an architect in the kingdom so elevated in his position and ideas as to resent the honest consent of his fellows,—that by his proved knowledge of his craft, which may be tested, and by the exhibition of genius in his works, which is otherwise not measurable, he was recognised as a Master Architect.

Shortly, then, I sum up this suggestion.

Recognition of distinctive fitness by the title of Master in Architecture, and election to this distinction by the suffrage of the Fellowship of the Institute with or without the consent of the architect so recognised, and so constraining those fit men and hitherto unwilling to be of the Fellowship of Architects.

THOMAS DREW, F.R.I.B.A.

BONES AS A BUILDING MATERIAL.

SIR,—In the Churchwardens' account of Kirby Wharfe, Yorkshire, for 1704, is an item for "Sheepshanks for hanging ye tiles, 2s. 6d." They were cut into pegs, and would be everlasting; some were found in their places in 1860. I cannot get a sight of any, but I have reason to think that their use was common. What is known of this material?

In Peter Kalm's account of his visit to England, in 1748, this Swedish observer describes walls or fences in common use near London to separate meadows, market-gardens, &c., built of the cores of ox horns, to each of which was attached part of the skull. In the best work they were put in layers as close as they could be packed, the points inwards; a 6-in. layer of earth was put between each layer of cores. The length was 4 ft., and the width the same. This disciple of Linnaeus notes half-a-dozen plants, such as convolvulus and wall barley, that covered the top. Slighter fences tapered to a narrower top. Are any such fences remembered?

Kalm also notices that these cores were carted out on the high roads and there spread, earth and sand being laid on them, which made the road firm and durable. Is our term, "hard core," applied to clinkers, &c., a survival from this use?

Kalm saw where a gentleman had set the leg-bones of oxen and horses in the ground as edges to his flower-beds, sticking them close together, the transversal end downwards and the round curled end upwards (to keep the earth from rolling down on the path), as he had seen also near Moscow. Here is a fresh item, I think, for the formal garden.

The grotto in Wanstead Park (recently burnt) was paved with sheep shank bones, laid in patterns,—conductive to corns, one would expect; but they would tally with the ornamental pavements of small round pebbles, common in old summer-bones, but now amongst the lost arts.

Bones, and particularly those which, like the cores, were not used in manufactures, would accumulate; but when their use in manure or in chemical works became known, they would cease to be applied to road-making and fencing.

THOS. BLASHILL.

LOCAL CONTROL OVER DRAINAGE AND SANITARY WORK.

SIR,—Having read Mr. Dicksee's and Mr. Kemsey's letters in your paper, I should be glad to add a word on the subject of local control over drainage and sanitary work.

I quite agree with what has been said on the un-

^{*} Not the "F.R.I.B.A.," surely.—Ed.

satisfactory working of the present system of local control, which varies both in quantity and quality according to the energy, knowledge, and scientific acquirements of the local Surveyor and Medical Officer of Health.

As the qualifications of these officers are usually dependent, as regards the Surveyor, on local, and, as regards the Medical Officer, on theoretical training, and as their work lies rather in detecting than in remedying defects, it is not surprising that the regulations by which they would control those who have to design and execute the work should be varied, insufficient, and even at times harmful.

To improve this state of affairs Mr. Dicksee would charge the County Councils with the formation of a code of regulations for their own guidance; but I would go further, and, as the question affects the well-being of the whole country in a similar manner, I would urge that one code of regulations should have force over the whole country.

This, I imagine, could only be undertaken by Government, and by means of a commission consisting of the best sanitary authorities, representatives of the County Councils and other local bodies, and their Surveyors, who should draw up a code of regulations, such as we have in the Building Acts.

To provide for the very rapid advance of sanitary knowledge, the code should be revised every five years, or at more frequent intervals if necessary. As this would entail a considerable outlay, it would require some justification from an economical point of view before it would be likely to gain public acceptance.

It should first be proved that the present system encourages wasteful expenditure, and then that the system I propose would tend to bring it within reasonable and profitable bounds.

I think I shall escape contradiction when I say that a very large proportion of sanitary work is now both designed and executed by those whose main recommendation is a self-assumed title and a bold advertisement, and that their operations frequently result in either evident failure or in condemnation when put to a scientific test.

It is a notorious fact that in some of the most fashionable parts of London large mansions have been drained and re-drained in the course of a few years. This has been both costly and wasteful, and the regulations of the local authorities have been powerless to check it.

A complete code of rules, dealing with the practical details of sanitary science, rigorously enforced, would render such operations well-nigh impossible, and the observance of the rules would afford a reasonable guarantee that the character of the work is respectable.

There are many, however, to whom it would not only be necessary to show that improved sanitary regulations are required, but that they can be obtained. Hence a much scepticism abroad on this subject, so many remedies having been found worse than the disease.

I am disposed to think that nothing but an agreement among sanitary scientists expressed in such a code of regulations as I have suggested, bearing the stamp of Government authority, would be sufficient to dispel doubt as to the theoretical possibility of a genuine sanitary reform, and, in addition to this, I believe that a practical illustration of the principles upon which the code is based would be required before many would believe in its practical efficacy.

This could be done by the establishment of museums in different parts of London and in large country towns, where both householders and others could study the subject. Two attempts have been made in this direction,—first, by the establishment of the Parkes Museum, and quite recently by the Hornsey Local Board in the sanitary exhibition arranged by their Surveyor, Mr. De Courcy Meade, which will doubtless be of great use in the neighbourhood; but the advertising element in the Hornsey exhibition, and the old-fashioned style of the Parkes Museum, shows that fallen into sufficiently strong hands.

Whether the plan could best be worked out as a Board of Technical Education or otherwise may be a question, but I would only urge that it should be done on a recognised principle; which would not be the case if it were left to the officers of separate County Councils, Vestries, or Local Boards.

ARTHUR BAKER, F.R.I.B.A.

COMPETITION AND COST.

SIR,—I have been interested in the remarks of your correspondent "Competitor" (page 323 *ante*) in reference to the Acarington Technical School Competition, and was pleased to see your own footnote to his letter.

I know nothing of this competition or the merits of the case, but it opens up a most important subject to architects, viz., the cost of competition buildings. Much has been said from time to time of the injustice of competition in respect to the wrong man being chosen, but there is another point of equal importance, viz., the unfairness of public bodies asking architects to make designs for them at a price which will scarcely provide a decent shell for the buildings they desire to erect.

If it were not a serious matter, it would be amusing to study some of their instructions.

They usually read in this way:—

"The building must be of substantial character, faced with stone, and the architect's estimate must include all fittings, electric lighting, gas and water supply, painting and decoration, &c., &c. The estimate must not exceed £—, and should include contingencies."

Here follows the usual clause which places the unfortunate competitor entirely at the mercy of those who have been dishonest or ignorant enough to set him a ridiculous problem, for it will generally be found that the sum named is too small by 50 per cent., with no margin whatever for extra and contingencies.

Of course, it may be said that the remedy is in our own hands, and that architects should decline such invitations; and for my own part I devote my time to private practice, and decline such unsatisfactory invitations; but it is to be regretted that those members of the profession who have a conscientious desire to do their work should be debarred from taking part in an important public competition because enough money was not specified for the building.

But where, it may be asked, is the remedy? Indeed, this is a difficult question to answer. A time when many of our leading architects squabbling with each other, there does not seem much chance of any help from them. We must therefore, look to you, Sir, to assist us, if you can, by giving every consideration to this question of cost in our competitions, and condemn with a stern hand the unfairness of our public bodies in setting such impossible problems.

With all due respect to our assessors, I do not consider they are free from blame; they choose design and with a passing remark leave the question of cost to be fought out as best it may. I own town is a case in point. A large public building was erected some years ago, the design being selected in competition by an able and experienced assessor. The estimate was absurdly low, and the assessor dealt with the subject of cost in a sympathetic way the town might possibly have saved many thousand pounds of wasted money repairing defects which would never have occurred had a larger sum of money been expended in the first instance.

If public bodies would only consult the assessors before the competition many of the difficulties would disappear; he could then advise them as to the cost of the proposed building, and the chances are that more architects of standing would respond to the invitation for designs, and our public buildings would, in consequence, be benefited.

It would be a good thing if some reliable statistics could be published in the *Builder* of the cost of public work of our public buildings which have recently been erected.

"WANTED, A FIFTEENTH-CENTURY SCULPTOR."

SIR,—In reply to Mr. Hutchinson's question whether I am going to churchwardens' meetings, I should have thought my letter was worded in such a way as to make it abundantly clear that I intend to do no such thing. I claim indeed, to be a representative of the one-tenth, not of the nine-tenths to whom he alludes; and it is just because I am so keenly alive to the danger of our country's works of art being so incompetently handled that I appealed to your readers to inform me if there be any artist living who is capable of restoring in the literal sense, an old carved figure such as mine. If any one else besides your correspondent feels uneasy on the subject, I give him my word, as a critic not too readily pleased, that, unless I am satisfied, I will never allow the statue to be touched. At the same time, I have no sympathy with the *cultus* of wreck, nor can I view with complacency the ravages of time, still less those of iconoclasm. Such accidents may have a picturesque attractiveness for the virtuoso, but no one can pretend that they are in accordance with the original design. And could the bygone artists they would be the first to complain of its present condition, and to wish its defects remedied wherever possible. My statuette was formerly coloured, and sufficient traces remain to enable me to paint it again, which I propose to do so soon as those parts which,—when I bought it, I found replaced by clumsy modern carpentry,—have been adequately renewed. The head of the Madonna at one time bore a movable crown, presumably of metal. That omission also I hope to repair. I have no doubt that Mr. Ashbee, of the Guild of Handicraft, will be able to reproduce a suitable crown, from old examples, in repoussé copper-gilt.

AYMER WALLACE.

WALSALL BATHS COMPETITION.

SIR,—In the Instructions issued for the above it is distinctly stated that any architect revealing his incognito (intended to be preserved by the "Motto" to be adopted by him) will be disqualified for selection; yet in the face of this definite clause it is a fact that the author of the design placed first, though not directly disclosing his name, yet went so

as to say that he had erected the baths at Meerwell.

Surely this amounts to the same thing, and could have been enough to disqualify him; yet he is placed first.

It shows that the statement biased the committee, that one of the councillors referred to in the discussion, saying he would rather trust one who had erected baths than a novice.

Another considerable difference of opinion between the Council with regard to the committee's commendation is evidenced by another councillor, who moved an amendment that a professional assessor should be called in, saying that if the bidders, as shown on the selected design, burst, they could not be removed after once being fixed in the positions shown.

Another councillor pointed out that the Turkish baths as shown could not be ventilated, and objected to the positions of the closets.

The design placed third had the following points, which I suppose specially recommended it for selection. Size of dressing-boxes, 2 ft. by 1 ft. 3 in.;

first and second-class entrances, but the classes

demarcated; no waiting-rooms, and the entrances

through a road 9 ft. 6 in. wide, encroaching 3 ft. on adjoining land. The second and third prizes were awarded to Walsall men. The second

design also has dressing-boxes 2 ft. by 1 ft. 3 in. It seems to me a great pity that the Town Council

invited professional gentlemen to waste their time in sending in designs if they did not mean to deal

with the matter in a perfectly fair and straightforward manner; and, although I do not suppose

it would have much effect, I would suggest that every competitor who fully complied with the

instructions should sign a memorial protesting against the way this competition has been decided. The

significant remark of one Councillor, who would not vote, and gave as a reason that he saw "so much

error on the subject," almost compels one to come to the conclusion that all was not as it should have been. I enclose my card.

ANOTHER COMPETITOR.

The Student's Column.

CONCRETE.—XIX.

CONCRETE-MIXERS, ETC.

HERE are several kinds of concrete-mixing machines to be obtained which can be worked either by hand or steam. One of the first to be adopted was a simple revolving cylinder inclined at an angle of 6 or 8 degrees. It was much used in Germany about thirty years ago. In America a cubical wooden box has been used, having an axle running diagonally through opposite corners; "eight revolutions of the box, made in less than one minute, are found to be quite sufficient to produce the most thorough incorporation of the mortar with the broken stone and gravel."* The box, measuring 4 ft. each way, is charged with about 36 cubic feet of mortar and aggregate, measured separately.

Messrs's concrete-mixer is a well-known machine; "it consists of a closed box or chamber revolving on an axle, and of such a form as, when half filled with the materials for making concrete, to cause them to be turned over sideways, as well as endways, four times in each revolution of the chamber, so that, in from six to twelve revolutions (the number necessarily being varied according to the weight and nature of the materials), a more perfect mixture is effected than can possibly be produced by hand." So say the makers, Messrs. Stothert & Pitt, of Bath.

Le Mesurier's machine has an inclined cylinder with dividing plates; Stoney's has an inclined trough along which the concrete-materials are carried by means of a revolving screw. A simple apparatus, described by Gillmore, consists of a vertical shoot divided into several compartments by shelves or flaps; the hinged alternately on opposite sides of the shoot; the materials are placed in the uppermost compartment, and the flaps are then dropped to an angle of about 45 deg. by means of levers, so that the materials fall from one flap to another until they reach the bottom in a state ready for deposition.

It is usually considered that machine-made concrete is more uniformly mixed than hand-made, and for considerable quantities it is much cheaper. Many concrete-mixing machines are used to-day for making the concrete required in the foundations and floors of large buildings, and they will come more into use for building purposes, when their advantages are better known. Before many years are over, architecta

* Gillmore.

will specify that all concrete in large works shall be machine-made.

Care and skill.—We are sometimes told that one of the great advantages of concrete is that skilled labour is not required, but that any one who can use a spade can make it. Yes; but there must be continual intelligent supervision. There is nothing which the architect has to use which requires more careful superintendence than concrete, and perhaps this is one reason why architects make so little use of it in their buildings. Concrete of a sort may be easily made, but it is not easy to make really good concrete. Each ingredient must be tested or strictly examined, and every process in the manufacture must be closely watched. However good the ingredients may be, the resultant concrete may be little better than consolidated gravel or broken-stone, unless the measuring, mixing, depositing, rammimg, and protection during setting, be carefully attended to.

Depositing.—The mixing ought always to be done as near as possible to the place where the concrete has to be used. It is better to move the platform or machine when these would be more than about thirty yards from the point of deposition. As mixing-platforms are more easily moved than machines, hand-mixing has some advantage in this respect over machine-mixing. For foundations in shallow trenches the concrete can be thrown by spade straight from the platforms, if these are near the trenches, or can be wheeled in barrows and tipped. The method formerly advocated of tipping concrete from a height of three or four yards is now discontinued for the reason that the larger stones in falling become separated from the mortar and smaller stones, and the concrete is not therefore homogeneous and uniform. For the same reason, shoots are now falling into disuse; a shoot has also the further disadvantage that the larger stones, on account of the velocity which they attain in passing down the shoot, fall some distance in front of its mouth; whereas the mortar, sliding gently down, drops vertically from the mouth, thus counteracting to a great extent the labour bestowed in carefully mixing the ingredients. This evil can be mitigated by turning over and re-mixing the concrete immediately it reaches the bottom of the shoot, but no time must be lost either in the original mixing or in the depositing if this second mixing is to do any good. For deep trenches, the concrete, if it cannot be mixed in the trench, may be lowered in barrows or pails; sometimes it is carried down in hand-harrows; more frequently, however, it is tipped from the surface, as the cost of lowering it is not thought to be counterbalanced by the advantages gained. For walls, floors, &c., it can best be carried and hoisted in pails or barrows.

The concrete ought to be deposited as soon after mixing as possible, as any disturbance of the mass, after the cement has begun to set, detracts from the ultimate strength. Rapidity of execution where quick-setting cement is used, is a point which must be carefully attended to.

For depositing cement under water, hoppers or shoots are sometimes used; but it is better to use a box or skip, so arranged that its contents can be released when it touches the bottom, either automatically or by pulling a cord. Into the details of such work and of the bag system it is not our province to enter.

Rammimg.—The advantage of suitable rammimg or punning is obvious. It compresses the concrete, rendering it more solid and free from voids, and squeezes out all superfluous water. We have seen that the Romans adopted it. Too much rammimg, however, is dangerous, as it may be continued until the cement has begun to set, and in this case a loss of strength is entailed. For this reason, concrete made with Roman or other quick-setting cement ought not to be rammimg.

Mr. E. C. Clarke (1885) "doubts the expediency of punning concrete, except when used in thin layers, as in pavement work, where it promotes consolidation and adhesion. In other cases, unless the concrete is very stiff, punning tends to separate the more fluid portions and to produce strata of different density, and also disturbs the setting." Note the saving clause,—"unless the concrete is very stiff."

Mr. Grant, however, carried out a series of experiments which showed conclusively that compression increases the strength of concrete. He declares that "for blocks, thin walls, sewers, arches, floors or paving, concrete may be

punned in layers with advantage." The manufacturers of artificial stone and paving and of concrete drain-pipes almost invariably compress the raw material in one way or another in order that the goods may be strong and impervious to water.

The results of Mr. Grant's experiments on the crushing strength of concrete compressed and not compressed were given in Table XX. (see *Builder*, p. 306, ante). The compression was effected by beating the concrete into the moulds with a small mallet. The resultant gain in strength averaged 28 per cent. for the 1 to 6 mixtures, 28 per cent. for the 1 to 8, and 24 per cent. for the 1 to 10, a gain by no means to be despised.

But concrete not only gains strength by compression; its density and consequently its imperviousness to water and its durability are also increased. Without rammimg it is impossible to have impervious concrete.

Of course it is impossible to ram the concrete of walls with the same vigour with which the concrete of foundations may be rammimg. For the latter a moderately-heavy punner of iron or of hardwood bound with iron may be used, but such an implement, if used for walls, would most likely cause the wooden boards enclosing the wall to bulge out, and the appearance of the wall would be irretrievably spoilt. For walls, therefore, a lighter implement should be used. Concrete floors are frequently consolidated by beating with the back of the spade used in spreading the concrete.

Layers.—Opinions differ as to the thickness of the layers in which concrete should be deposited. Some advocate thick layers, some thin ones. The lime-concrete foundations of the Army headquarters at Simla were rammimg in 3 in. layers. Layers so thin are very seldom adopted, because, whatever care may be taken, the joints between the layers are always a source of weakness. During the operation of punning, some of the water in the concrete is forced to the surface and brings with it part of the constituents of the cement, causing sometimes a film of soft clayey matter upon the surface. This effectually prevents the adhesion of the next layer. For this reason, concrete, which has been exposed for a day or two, should be swept clear of this matter, and also of all loose stones and dust, before another layer is added. The surface should also be well watered, and if good work is required, should be roughed with a pick, although this last operation is not as beneficial as is sometimes imagined. Mr. Bernays recommends that the surface of concrete in large walls, if it have been long exposed, should, in addition to being swept and watered, be dusted over with neat cement, and sometimes have a chase, say, 12 in. by 9 in., cut in it to form a key for the next layer. Some persons think each layer, after being swept, ought to be watered with thin grout before the next layer is laid, but grout is somewhat uncertain in its action.

Layers 9 in. or 12 in. thick are often specified, but layers 18 in. thick are on the whole more satisfactory. Sometimes a thickness of 2 ft. or even 3 ft. is laid at one operation. Thick layers ought not to be attempted unless a good machine or a very large number of men are employed in mixing the concrete, as otherwise the depositing and rammimg such a thickness may take so long that the lowest portion may have begun to set before the men can finish the upper part, and this will cause a disturbance of the setting, and consequent weakness. On the whole, it may be considered best to deposit concrete foundations less than 18 in. thick in one layer, and above this thickness in two or more layers not exceeding 18 in. each. The concrete of retaining walls may be rammimg in 18 in. or 24 in. layers. The frames used in forming the walls of buildings usually allow a thickness of 18 in. to be deposited at one operation, and never more than 24 in. Paving and floors must always be rammimg in one thickness; the surface, however, may be finished with finer concrete after the mass has set.

In the formation of concrete arches, care must be taken that the concrete is not deposited in thin layers following the curve of the arch, but the full thickness of the concrete must be laid at once and rammimg in the direction of the thrust so as to form longitudinal courses like continuous voussoirs, having the joints between adjacent courses radial to the curve of the arch. This is an important point, especially if the whole arch cannot be completed in one day. The breadth of the longitudinal courses

will depend on their depth, &c.; it may be from 6 in. to 18 in. for large arches. Small arches, such as are used in floors, will be laid at one operation. During the ramming of the concrete in large arches a movable board with curved face can be used to retain the concrete and to form the extrados.

Protection during setting.—Any disturbance of concrete during setting injures it. Cement cannot be gauged, left to set for a short time, and worked up again without loss of strength. Cement ground with water in a mortar-mill for half an hour makes considerably weaker briquettes than cement gauged by hand as quickly as possible. After cement has begun to set, it ought not to be disturbed until it has hardened sufficiently to bear easily any weight that may be put upon it. Walking across a concrete floor, before the hardening is sufficiently advanced, will cause rotten places in the concrete. For this reason, all concrete, especially in floors, arches, and roofs, should be carefully protected for some weeks after being laid,—the longer the better. Wherever practicable, all traffic across such concrete should be absolutely forbidden for as long as possible. When traffic across it is a necessity, the concrete should be covered with moist sand or sawdust or sacks, on the top of which strong planks must be carefully laid where required. It is useless to make good concrete, unless care be taken to protect it until it is hard enough to resist wear-and-tear.

GENERAL BUILDING NEWS.

NEW INFIRMARY, SOUTHPORT.—On the 27th ult., the foundation-stone of a new infirmary was laid at Southport by Dr. Pilkington, the Mayor of the borough. The infirmary estate is situated about a mile and a quarter from the centre of the town, and is some five acres in extent. It is bounded on three sides by streets, the main frontage to Scarborough New-road extending 121 yards. The frontage of the building will be 243 ft. The style is a free treatment of Flemish, the external walls being of red stock bricks, relieved with Longridge stone dressings and a small quantity of terra-cotta, with roofs of Westmorland slates and red ridings. The central portion of the main frontage will be two stories in height, while the ends and corridors, &c., will be one-storyed. In the centre of the front block of buildings there will be an octagonal brick and stone clock-tower, surmounted by a wood and lead lantern, rising to a height of 76 ft. above the ground-line. One of the main features of the building will be the central arrangement of the out-patients' department, which is so planned that when patients leave the consulting-room they are at once in the centre of the building and equally distant from each of the wards. There will be accommodation at one time in the out-patients' department for 70 persons. The accident receiving-room and the operating-room are so planned as not to be within hearing from any of the wards. From the centre of the main corridor, running to the back of the building, is a corridor 9 ft. wide, from which several of the rooms before mentioned are arrived at. The isolation ward block is a distinct hospital in itself, having ward nurses' room, two wards for two beds each, baths, lavatories, and linen rooms. Ornamental gardens surround the whole buildings. The site will be enclosed in a boundary-wall of stock brick and stone. Mr. C. Sydney Ingham, of Southport, is the architect.

NEW FIRE STATION FOR DULWICH.—On the 31st ult. the memorial stone of a new fire station was laid on a site in Lordship-lane, Dulwich, by Mr. N. W. Hubbard, the Chairman of the Fire Brigade Committee of the London County Council. The building will stand on ground leased from the authorities of Dulwich College, the frontage being 80 ft. and the depth 250 ft. Red brick relieved with Portland-stone dressings will be used for the five stories, including the basement, the roof being covered with Broseley tiles. A look-out tower, 100 ft. in height, will be erected. The design is by Mr. T. Blashill, the Architect to the Council, the drawing being prepared under the supervision of Mr. Robert Pearsall. Messrs. Stimson & Co., of Brompton, are the builders (the clerk of the works being Mr. J. Voice), their contract of 10,610*l.* being the one selected by the committee.—*Daily News.*

ADDITIONS TO TRINITY CHURCH, CLAUGHTON.—Additions to Trinity Church, Cloughton, which stands at the corner of Bessford and Alton roads, Oston, have recently been completed. An organ chamber has been built behind the pulpit, and the organ has been moved from the gallery and rebuilt in it, with a new front. The pulpit has been remodelled, and a new platform has been provided, with stalls for the choir on either side. The new front of the outside, in style, are approached inside of the lecture-hall, and from the church and lecture-hall through the late vestry, which has been converted into an ante-room, leading into the new vestibule. They comprise a session-house, a

committee-room, and a vestry, with necessary offices. The woodwork throughout is of polished pitch-pine. The wrought-iron gasaliers and brackets are by Messrs. Singer, of Frons, and the stained and leaded glass is by Messrs. Shrigley & Hunt, of Lancaster. The session-house and committee-room have been furnished in oak, by Messrs. O'Neill; and the vestry by Messrs. Waring, of Liverpool. The total cost is estimated to be about 1,450*l.*; and the work has been carried out by Mr. W. H. Forde, of Birkenhead, under the superintendence of the architect, Mr. R. G. Sykes.

SCIENCE AND ART SCHOOLS, HEATON, NEAR NEWCASTLE.—New science and art schools situated in North View, Heaton, have recently been opened by the Mayor of Newcastle. The building is constructed throughout of Sherburn bricks, the string-course and the cornice being of the same material. At the east end of the building there is an octagonal tower and a bell-turret. Internally, the corridors are all laid with concrete, the staircases are of the same material, and the various rooms are so arranged that they all have entrances from the corridors, besides having direct communication one with another. In the basement portion of the premises a heating apparatus is placed for the purpose of warming all the rooms by hot water. On the ground floor there are five class-rooms, capable of accommodating in all about 400 scholars. There is a cloak-room for boys situated at this portion of the building, with lavatories included, and retiring-rooms for the teachers are also provided. On the first floor there is a cloak-room for girls. The science and art department is on the next floor. It consists of six class-rooms. In addition to the class-rooms there is a room for the use of the head master, a photographic developing-room, a lecture-room and the laboratory. Opposite the laboratory there is an apartment in which cookery lessons will be given to girls, and a room for the head mistress is close at hand. The apartments on the floor above are to be used for storing purposes. The various rooms are fitted with wrought-iron "Hopper" ventilators for the supply of fresh air. The school is provided with two playgrounds, for girls and boys respectively. The frontage of the school is 137 ft. The architect for the building has been Mr. Jos. Elliot, North Shields, the heating apparatus was supplied by Messrs. Aynsley & Jennie, Newcastle, and the whole of the work has been carried out under the supervision of the architect, Mr. D. Campbell.

PROPOSED REBUILDING OF THE ROYAL SICK CHILDREN'S HOSPITAL, EDINBURGH.—According to the *Scotsman*, the plans of Mr. G. Washington Brown for the proposed rebuilding of the Edinburgh Royal Sick Children's Hospital were approved on the 17th ult. The plan shows a building based in its style, upon the English Renaissance, occupying three sides of a quadrangle facing Carling-place, having the administrative department in the centre block and the wards in the wings. The central building is carried up two stories above the wings, and is finished on its east and west ends with galleries. The wall-head is marked by a cornice and half-arching, and a feature of the facade is the large square projecting oriel windows, which balance each other on each side of the central doorway, and are carried above the wall-head to terminate in a gable. Between these projecting oriels, and on the same plane, is the entrance porch, formed of a triple arch with entablature, and having over the middle archway a circular pediment enclosing the Royal Arms. On the north side of the building the exterior of the administrative block is enriched with projecting windows, similarly treated and finished to those on the south elevation. At each corner of the wings there is an ornamental turret, and between these, and opening upon the wards, are half-arched balconies. The sides are plain, an ornamental feature, however, being given to them by a series of gables breaking up the wall-head. The building is so set that it runs parallel with Carling-place. The wards are 140 ft. apart, and stand north and south. The main doorway in the central block gives admission to a corridor, which runs east and west along the whole length of the building, and in the far end communicates with the wards. A cross-ventilated corridor cuts off the main building from the wings in which are the sick wards. Each ward is 84 ft. 6 in. in length, 23 ft. wide, 15 ft. high, and gives accommodation for twenty-four beds. Similar wards are repeated in the corresponding positions on the first floor. On the second or upper floor there is in the east block a spare ward with accommodation for sixteen patients; while in the west block, on the second floor, is an observation ward with four beds, and two isolated wards with one bed in each. This gives a total of 113 beds in the new hospital. Each ward has its own kitchen, &c., at the north end of the building next to the lavatories, bath-rooms, &c., are situated in the turrets at the south end of the wards. These lavatories, &c., do not open directly off the wards, but off a ventilated corridor or lobby lighted by windows on each side. The wards are lighted by windows on each side and at the southern end. Fronting the doorway of the administrative block there is a lecture theatre, 25 ft. square, which will be fitted with galleries for the students. This is repeated on the first floor.

On the first floor are placed the Board-room, a small museum in connexion with the lecture theatre, an ophthalmic room, and dispensary, the study, dining-room, and a sitting-room for the nurses; while on the second and third floors are located the back-room, the accommodation for the head nurses, and of the medical staff generally. On the third floor towards the north are placed the kitchen, scullery, and servants' hall; and in the attic or fourth floor are the bed-rooms of the domestics, store-rooms, &c. The flats are constructed with staircases and lifts. It is intended to build the hospital of red sandstone, and the various floors throughout will be practically fireproof,—the floors being carried on steel beams, and lined with cement concrete. The expense of erecting the hospital will amount altogether to from 25,000*l.* to 30,000*l.*

FREE LIBRARY EXTENSION AT KIDDERMINSTER.—The foundation-stone of the new Free Library for the borough of Kidderminster was laid on the 17th ult. by Mr. Michael Tomkinson, J.P., High Sheriff of Worcestershire. The erection of the Library completes a set of buildings for art, science, and literature. The exterior of the Library will be similar to that of the School of Art, and the cost of its erection will be 3,240*l.*, exclusive of fittings, &c. There will be two large rooms on the ground floor, the larger of which will be 49 ft. by 52 ft., and will be used as a reading-room. The other apartment is to form the lending library. There will be a gallery round the reading-room. This will be used as a reference library. Part of the basement and the whole of the first floor will be used for science classes. The builder was Mr. Smith, the architect being Mr. J. M. Gething.

PUBLIC BATHS, ASTON MANOR, BIRMINGHAM.—New public baths have just been erected at a cost of 13,000*l.* in Victoria-road, Aston. The building has a frontage of 80 ft. to Victoria-road. The style adopted is French Renaissance, and the building has been carried out in red terra-cotta, with tile roofs. The ladies' entrance is in the centre. To the right is the first-class men's and to the left the second-class men's entrances. The spaces between the entrances are recessed and finished with a balustrade and cornice. On entering the ladies' department, directly in front is the ticket-office, and to the right opening on to a short corridor are three first-class slipper-baths, while to the left opening on to another corridor are four second-class slipper-baths, a store-room, and an attendant's room. The first-class men's entrance is fitted with a screen similar to that in the ladies' entrance, beyond which is a passage to a gallery which runs round the swimming-bath. To the right are five slipper-baths, and to the left the ticket office, attendant's room, and the entrance to the first-class swimming-bath. This bath is 80 ft. long by 58 ft. wide, and has a water surface 3 ft. 6 in. by 39 ft., being 6 ft. deep at one end and 4 ft. 6 in. at the other. On either side are arranged the dressing-boxes, forty-four in number, with brick divisions, the fronts of which are lined with glazed bricks. To the left of the entrance is a hot room, and to the right a lavatory. At the opposite end, in the centre, is a diving stage, and at either side a spiral iron staircase leading to the galleries, which are 6 ft. wide, and run the whole length of the bath, communicating at the opposite end with a central gallery over the entrance. The galleries are arranged to accommodate about 400 spectators. The promenade round the bath is about 7 ft. wide at the ends and 4 ft. 6 in. in the sides, and is paved with concrete. The tank is lined and paved with white glazed brickwork. The second-class swimming-bath is 72 ft. long by 47 ft. wide, with a water surface 60 ft. by 33 ft., of the same depths as the first-class bath. On three sides of it are arranged dressing-houses, 55 in number. To the left of the entrance is a lavatory, and on the opposite side a soap bath. The whole of the building, except the committee room, is heated by steam coils, and the water in the swimming-baths by steam. All the corridors and slipper-baths are paved with tiles. Immediately at the rear of the second-class swimming-bath is the engine-bouse, underneath which is an artesian well 400 ft. deep, from which the water supply of the baths is pumped by a 14-h.p. horizontal engine. This engine also drives a dynamo from which both the baths and the public offices, Witton-road, will be lighted by electricity. In a room leading off the engine-bouse is an electrical storage battery, containing 60 cells. Adjoining the engine-bouse is the laundry, fitted with washing-machines, together with a drying-closet heated with steam-pipes. Underneath the laundry is the boiler-house, communicating with the engine-bouse by a staircase. A sub-ventilator, 6 ft. in height, commencing at the boiler-house, runs under the entire length of the baths, and terminates at the first-class men's slipper-baths. In this sub-way all the steam and hot and cold water service pipes, electrical mains, and drains are laid. At the rear of the site, and facing, communicating with the superintendent's house. The whole of the corridors and private baths are lighted with Swan-Edison incandescent lamps. The front entrance is lighted by two arc lamps of from 700 to 1,000 candle-power each. Two side lights, with reflectors, fixed about 3 ft. below the water-line, have been introduced in the first-class bath. The baths have been erected from the designs and

er the superintendance of Mr. W. A. Davies, Engineer and Surveyor to the Board, Mr. Smithing as clerk of works. Mr. F. N. Stephens, of ou, is the builder, the other contractors being J. C. Edwards (Raabon), for the terra-cotta; J. E. Danks (Oldbury), boilers; the Griffin ndry Company (Birmingham), basing, &c.; srs. Percy & Co., engine and pumps; Mr. s Gildesley (Willeshall), roof and tanks; Mr. North (Aston), well; and Messrs. Fowler & cster (Birmingham), electrical installation.

NAVIGARY AND ENGINEERING NEWS.

THE OLDHAM SEWERAGE SCHEME.—On the 21st Mr. Arnold Taylor, Local Government Board inspector, set at the Oldham Town Hall to hold an inquiry regarding an application of the Oldham Corporation to borrow 200,000*l.* for the purpose of their sewerage scheme. Mr. Bidder, M.P., represented the Oldham Corporation. Mr. Bidder stated that constant threats from the corporations of Manchester and Salford and the authorities of the Manchester Ship Canal that they would be taken if Oldham did not see to pollute the Irwell and Mersey by its sewage had caused the Oldham Corporation to take the matter, with the result that the present one had been prepared. Evidence was given by Mr. Mayor, the ex-Mayor, Mr. Law, the Engineer, Mr. Middleton and the riparian owners. The Mayor said that the ground on which another area would cause the Irwell to flood, would damage the mills along the banks. A large discussion took place on this, but the Inspector did not effect the scheme as a whole.

OLDHAM SEWERAGE PURIFICATION WORKS.—On the 5th ult. an inquiry was conducted at the Oldham Public Buildings by Mayor-General C. Phipps, M.P., and the members of the Local Government Board, with reference to an application made by the Local Board to borrow 5,700*l.* for works of sewage disposal, and 1,100*l.* for street improvements, &c. Mr. H. Bertram Nichols, C.E., Birmingham, the engineer for the works, explained the scheme, and gave evidence in support of the application. It is proposed to adopt the International Sewage Purification Company's system by passing sewage after being treated in the tanks through arite filter-beds. Mr. H. Richardson, Town Surveyor, gave evidence with regard to the loan for cost improvements. After the inquiry, the Inspector, accompanied by Mr. Nichols, the Engineer, the Town Surveyor, and some of the members of the Board, visited the sewage farms and the various points in the town where the improvements were proposed. There was no opposition to the application.

FOREIGN AND COLONIAL.

FRANCE.—The Jury of Architecture of the Ecole Beaux-Arts have decided the competition in architectural history for the First Class, the object of which was "The Restoration of the site of the Nymphæum at Nîmes. Among fifteen competitors the jury awarded second prize to M. Léonard, pupil of M. Latoux, and to M. Arnaud, pupil of M. Pascal. —M. Bossard, architect to the Department of "Postes et Télégraphes," has just completed the new Hôtel des téléphones in the Rue Gutenberg, which will be opened in a few days. —In connexion with the Art Exhibition at Ghent, the Belgian Government has awarded gold medals to the architect, and to the Comptroller and honorary diplomat to M.M. Bonnat, rière, Carolus Duran, Dagnan-Bouveret, Pantinot, Ferrier, Hébert, Jules Lefebvre, Lhermitte, Henri Martin, Pointelet, Rodin, Roll, and Roybet. —A new Lycée has been opened at Rouen, and a group of scholastic establishments. —Next Wednesday will take place, at the Mont-Paroisse cemetery, the inauguration of the monument erected to the memory of Ch. Decker, the celebrated pianist, formerly Director of the Stévens Manufactory. —Some workmen have discovered, in digging a trench in the Avenue des Gobelins, a fine coffin rudely sculptured, apparently of the Illo-Roman period. —A Scandinavian Committee has been formed to offer to M. Pasteur the bronze medal for the work of the Swedish sculptor Stephan Sinding. On the face a female figure personifying "Le Nord," inscribed on a stone the titles of the works of M. Pasteur. On the other side are engraved the names of the members of the Committee. —It is announced that the great fortress at Perpignan, the name of the Casern, is to be used as a military prison. The edifice, in which, dates from 1319. It is Moorish in style, and is built by the kings of Majorca. It is used as a "monument historique," and is consequently under the care of the Ministry of Fine Arts. It is much to be wished that the same course should be taken with the case of the Popé at Arignon, now used as a track, and subject in consequence to treatment which will end in destroying all its archaeological and artistic value. —M. Formigé, the architect, has made a design for a columbarium for the cemetery of Père Lachaise. It will be constructed

in connexion with four crematories, and will form a double portico divided by a longitudinal wall containing the funeral urns. It will present four faces, and is so designed that each of the four quarters can be built separately, as needed. The total cost will be 682,200*fr.*

BERLIN.—The final competition for the design of the memorial monument to the late Emperor William, which the "Rhine Province" wishes to erect, has been won by Bruno Schmitz in collaboration with the sculptor Hundrieser. The main feature of the monument is to be an equestrian statue of the late Emperor. —Of the twenty-three sets of drawings submitted to the promoters of the great Dresden Railway Terminus competition, two, one by Messrs. Giese & Weidner, of Dresden, the other by Herr Roszbach, of Leipzig, were classed first. The assessors did not consider any design deserving of the first premium of 500*l.* They distributed two prizes of 350*l.* each and five of 100*l.* each. —The competition promoted by the *Berliner Architekten Verein*, with the purpose of obtaining proposals for the site of the International Exhibition, has been won by M.M. Gremer & Wolfenstein, of Berlin, who worked in partnership with "Stadtverbauth" Koehn, of Charlottenburg. There were fourteen competitors. —An exhibition of the work of pupils of the arts and crafts school at the "Kunstgewerbe Museum" distinguishes itself from similar ones by a high standard of the exhibits shown.

ROUMANIA.—A competition for the design of a proposed terminus station at Dubarst has been opened. It is an "international" one, and the first premium is 10,000 francs, to which will be added a fee of 100,000 francs for a set of working drawings of the design premiated. There is to be a jury of international experts in lieu of an assessor. Something in detail is not until May 1, 1893. Certain restrictions are made as to the rendering of the drawings, which have to be drawn to 1/32 and 1/16 scales. Full particulars, together with the regulations, are obtainable at the Roumanian Legation, the language used being French.

MISCELLANEOUS.

CHRIST'S HOSPITAL.—Judging from letters we have received, there seems to be a great deal of anxiety on the part of some members of the architectural profession to know when and how the new schools are going to be built. Nothing is yet settled as to the means to be taken to procure plans, whether by competition or privately; but we are informed that the Council will meet to discuss the question shortly.

CLOCK, PURSTON, NEAR PONTEFRAC.—This important mining village has hitherto been without a public clock until Mr. John Waller, of the Junction Hotel, Purston, and a member of the Board of Guardians, has had one fixed on his new premises at the junction of the Purston, Ackworth, and Pontefract highways. The clock illuminated and shows the time on two large dials. Messrs. Potts & Sons, of Leeds, are the makers of the clock.

THE "RAPID MIXER."—This is a very simple machine which has been exhibited by Messrs. H. Young & Co. at the Brewers' Exhibition at the Agricultural Hall, and is applicable for any liquid which requires mixing. It consists of a conical-shaped vessel, open at both ends, and with projecting blades or floats inside, which is placed vertically in the middle of the tank containing the liquid to be mixed, and rapidly revolved horizontally, when the liquid is drawn in at the narrow end of the cone and thrown out by centrifugal force at the wide end, getting quickly mixed. The advantages are simplicity of action, and the fact that the mixer can be made of such materials as stoneware or glass, as well as of the more ordinarily-used materials for this kind of implement, so as to be available for liquids which would corrode metal.

THE REGISTRATION OF PLUMBERS.—An examination of candidates for registration by the Plumbers' Company was held on Saturday at the new Borough Polytechnic Institute. The examiners were Messrs. Chas. Hudson (Chairman), W. H. Webb and F. Knight (Master Plumbers), and H. Hobbs ("Battersea" Lodge), G. E. Munn ("East London" Lodge), and E. A. Nisro ("No. 1" Lodge), of the United Operative Plumbers' Association of Great Britain and Ireland, and Mr. C. T. Mills, M.L.C., Principal of the Educational Department of the Institute. In addition to undergoing a practical test of manipulative skill, each candidate was required to answer a series of questions specially framed with the object of ascertaining his knowledge with reference to the various materials used in the plumbing, and to the sanitary arrangements inside and outside dwelling houses. Of the twenty-four candidates who presented themselves for examination, we are informed that only three succeeded in satisfying the examiners of their qualifications as practical plumbers. We learn that fifty-four students have joined the plumbing classes which were opened at the Institute on the 3rd ult. —ROBERT BOYLE & SON (LIMITED). We understand that the directors of Robert Boyle & Son (Limited), ventilating engineers, London and Glasgow, have resolved to recommend a dividend of 12½ per cent., free of Income-Tax, for the year ending September last, after placing to the reserve

fund one-sixth of the profits earned and carrying forward 1,887*l.* 4*s.* 9*d.* This, we are told, makes the seventh dividend, 12½ per cent. being paid for the last three years, and 12 per cent. for the previous years. The directors propose that the dividend for the current year will balance the subscribed capital of the company, including the ordinary shares held by the vendor, when 100 per cent. will have been paid. The business done during the year is stated to have been considerably in excess of the previous year, though that was, we believe, the most profitable year since the formation of the Company. The directors attribute this success, and their consequent ability to pay such a handsome dividend, to their constant study of the requirements of architects, and to the great and ever-increasing demand for the latest improved form of the self-acting air-pump ventilator. The Company announce that they have at present some very important contracts in hand at home and abroad, including the largest ventilating contract they have ever received from the British Government, and a contract of equal magnitude for the Spanish Government. Mr. Robert Boyle, as we lately mentioned, has recently visited the East and Australasia, and has established agencies in Burma, Queensland, New South Wales, Victoria, South Australia, and New Zealand, arrangements having also been made for the manufacture of the different ventilating and sanitary appliances in such of the Australian Colonies and New Zealand.

ELECTRIC LIGHT FOR PORTSMOUTH.—The foundation-stone of a new electric light station at Portsmouth was laid on the 27th ult., on the site of a music-hall which was burnt down a year or two ago. The system to be adopted is the invention of Professor Garnett, and the work will cost 60,000*l.* It is proposed to light two miles of the sea-wall and four miles of the principal thoroughfares by means of 124 arc lamps, each of 2,000 candle-power. The lighting is expected to be in operation next August. —*Morning Post.*

IMPROVEMENT OF MANX HARBOURS.—The Committee of the Manx Tynwald Court, appointed to consider Governor Walpole's proposals for the improvement of the Manx harbours, met at Douglas on the 27th ult., Mr. Walpole presiding. The sitting was principally occupied by considering various proposals for the protection of Douglas outer harbour. Five plans were submitted by Mr. James Walker, C.E., Engineer to the Isle of Man Harbour Commissioners. The estimated cost ranged from 70,000*l.* to 250,000*l.* No decision was arrived at, consideration of the matter being adjourned. The committee then took up the question of a bridge across Douglas Harbour, but that matter was also adjourned for further inquiry.

THE NEW CHIEF ENGINEER OF THE GREAT WESTERN RAILWAY.—The appointment of Mr. J. C. Inglis, M.Inst.C.E., as engineer-in-chief of the Great Western Railway, has just been ratified.

LIVERPOOL ENGINEERING SOCIETY.—The first ordinary meeting of the nineteenth session of this Society was held at the Royal Institution, Colquhoun-street, on the 20th ult., when Mr. Robert E. Johnston, M.Inst.C.E., President, delivered his inaugural address, selecting as his subject "The Development of Railways and the various Improvements in the Construction and Working which have taken place since their introduction." After briefly describing the means of locomotion at the beginning of the century, and the opening of the Liverpool and Manchester Railway, he stated that at the present time the length of the railways of the United Kingdom amounted to no less than 10,273 miles, representing a capital outlay of 857,472,000*l.* The total receipts for the year 1890 were, approximately, 76½ millions, and the working expenses about 41½ millions, leaving a balance of about 35 millions as the profit of one year's working representing an average dividend of 3.90 per cent. per annum on the total capital expended. The lecturer then proceeded to discuss in detail the various improvements which had been effected in the construction of railways since their introduction, in the design of bridges, tunnels, permanent way, and rolling-stock, and in doing this dealt with the construction of the Severn and Mersey subaqueous tunnels. The lecturer pointed out that the practical outcome of the labours of the Managers and Engineers of our railways in their endeavours to render railway traveling as safe as possible had been to reduce the number of fatal accidents in 1890 to one in every 163½ million passengers carried. This, he stated, went a long way to prove the fact that one of the safest places one can be in is a railway train. In conclusion, the lecturer gave a graphic description of the peculiar means adopted in constructing railways with exceptionally steep gradients in Switzerland. A vote of thanks to the President terminated the proceedings.

FIRE-ENGINES AND THE HEIGHT OF BUILDINGS.—We hear that important improvements are about to be made by the London County Council in the working of the Metropolitan Fire Brigade. Hitherto, as we are informed by Messrs. Shand & Mason, the largest land steam fire-engine in use by the Brigade has not exceeded a capacity of 350 gallons per minute, whilst the majority are of 250 gallons only. On account of the increased height of London buildings, however, and for other reasons,

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered. Includes entries for Town Hall, George Hospital, and various schools.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Lists various construction and repair contracts.

CONTRACTS.—Continued.

Continuation of the Contracts table, listing items like Theatre, Sewerage Works, and various building materials.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be received. Lists various public service roles.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., § viii. Public Appointments, p. xx.

The Council recently decided to acquire engines of a more powerful description, and an order has been given to Messrs. Shand, Mason, & Co., for a new double cylinder pattern of engine made by them.

LEGAL.

CASE UNDER THE METROPOLITAN BUILDING ACT. At Bow-street Police-court, on Tuesday, Messrs. Holland & Hannen, builders, Duke-street, Bloomsbury, appeared to an adjourned summons charging them with infringing the fourth sub-section of the 27th section of the Metropolitan Buildings Act.

In giving judgment Mr. Vaughan said,—This summons has been taken out by Mr. Wallen, the District Surveyor of St. Pancras, against Messrs. Holland & Hannen for irregularities in the construction of a building in Grafton-street, contiguous to the premises of Messrs. Shoolbred, and intended, when completed, to form an extension of those premises, and for non-compliance with a notice requiring such irregularities to be amended.

Mr. Thomas Horton appeared on behalf of the London County Council; Mr. Grain was for the defendant. In giving judgment Mr. Vaughan said,—This summons has been taken out by Mr. Wallen, the District Surveyor of St. Pancras, against Messrs. Holland & Hannen for irregularities in the construction of a building in Grafton-street, contiguous to the premises of Messrs. Shoolbred, and intended, when completed, to form an extension of those premises, and for non-compliance with a notice requiring such irregularities to be amended.

mitted to Mr. Wallen, to the best of his recollection. The cubical contents of the whole building are 272,800 ft., exclusive of the staircase, which is 16,656 cubic feet additional. The floor area is 62,087 ft. Now, these being the facts, Mr. Wallen complains that the provisions of the fourth sub-section of the 27th section of the Metropolitan Buildings Act have not been observed. By this sub-section it is enacted, "That every warehouse or other building, used either wholly or in part for the purposes of trade or manufacture, containing more than 216,000 cubic feet shall be divided by party-walls such manner that the cubical contents of each division shall not exceed the above-mentioned number of cubic feet."

MEETINGS.

- FRIDAY, NOVEMBER 4. Architectural Association.—Mr. W. Young on "The Application of an Architectural Education." 7.30 p.m.
FRIDAY, NOVEMBER 5. Royal Institute of British Architects.—Opening Address of the Session, by the President, Mr. J. Macvicar Anderson. 8 p.m.
TUESDAY, NOVEMBER 8. Institution of Civil Engineers.—(1) Address by the President, Mr. Harrison Hayler. (2) Presentation of the Metals, &c., awarded last session. 8 p.m.

WEDNESDAY, NOVEMBER 3. Liverpool Engineers' Society.—Mr. Arthur J. Maginnis on the "Development of the Machinery of Atlantic Liners."

THURSDAY, NOVEMBER 10. Institution of Electrical Engineers.—Discussion on Mr. James Swinburne's paper on "The Problems of Commercial Electrolysis." 8 p.m.

FRIDAY, NOVEMBER 11. Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. F. J. Sykes on "General Powers and Duties of Sanitary Officers." 8 p.m.

RECENT PATENTS.

- 14,137.—IMPROVED PIPE-JOINT: A. Turnbull.—According to this invention a joint is made of two flanges connected by corrugated steel and riveted at their outer circumference. As the steam-pipe expands or contracts, the flexible steel-plate allows the flanges to come closer together or to go further apart without any injury being done to the pipe.
12,282.—SLOW-CLOSING VALVES FOR W.C.S.: J. F. J. Sykes and another.—Several improvements in the ordinary valve are made with a view of avoiding the usual difficulties of choking or inefficient egress for water.
9,773.—WATER-SUPPLY TAPS: F. Becker.—This is an automatic water-supply tap, with a chamber which fills through the bore in the gauge or regulator, whereby a rubber diagram which has been raised from its seat by the pressure of water receives a counter pressure, which consequently forces it into its seat again, thus closing the tap after a certain quantity of water has run out.

NEW APPLICATIONS FOR LICENSES PARENT.

On 17-18, 523, P. Mooney, Automatic Flush closets.
On 18-18, 603, F. Lynde, Water-closet Flushing
On 18-18, 609, H. and W. Jennings, Square Drill

PROVISIONAL SPECIFICATIONS ACCEPTED.

F. Harvey, Water-closets-16,307, H. Owens,
C. G. F. Co., Metal Water-closets-18,612,
W. Westlake, Door and latches-18,612,

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.
28, A. Churchman and W. Dejeudon, Portable

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

ROBERT 18.-By Humbert, Son, & Flint (at Wat-
son). "The Colney Bute Estate," Watford, seventy-

reversion in 6 yrs., 1,170; i.g.r. of 284, Vic-
toria-pl., reversion in 10 yrs., 5,000; i.g.r. of
62, Victoria-pl., reversion in 23 yrs., 1,050; i.g.r. of
10, Victoria-pl., reversion in 10 yrs., 430; i.g.r. of
21, Pomeroy-st., reversion in 49 yrs., 190; i.g.r. of
21, 148 and 21, 108, Picton-st., Camberwell, rever-
sion in 12 and 14 yrs., 4,000; 50, 61, and 63, Picton-
st., i.g.r. of 10, East-st., East-st., Barking, rever-
sion in 78 yrs., 2,000; i.g.r. of 6, East-st., reversion in
10 yrs., 140; 25 and 37, Brighton, Brighton, u.t. 11
yrs., g.r. 20, 140, 22 and 23, Albert-st., Battersea, u.t.
50 yrs., g.r. 121, 550; 14, Vaughan-rd., Camberwell,
u.t. 40 yrs., g.r. 34, 305; 68, Trafalgar-rd., Old Kent-
rd., u.t. 40 yrs., g.r. 51, 230; 25 to 30, Charles-st.,
Westminster Bridge-rd., 1, 310; 1, 310, and 9, Wellclose-st.,
u.t. 10, Manning-st., Linehouse, 1, 162; 33, Poole-
rd., Hackney, u.t. 63 yrs., g.r. 51, 55, r. 302, 282;
18 to 21, Longford-rd., Mile End, 1, 2,000; 1 to 7,
Cleveland-st., 1, 1,050; 10, 21, and 23, Claverly-st.,
u.t. 51 yrs., g.r. 141, 124, 61, 360; 25 and 30, Blakesley-
st., Commercial-rd., u.t. 5 yrs., g.r. 111; 5 and 7,
Exmouth-st., u.t. 1 year, g.r. 31; and 21, Jamaica-st.,
u.t. 1 year, g.r. 45; 4, 31, 31, and 9, Wellclose-st.,
St. George's-in-East, 1, 1,225; 38, Wellclose-st.,
1, 250; 12, Palmer-st., Spitalfields, 1, 1,000; 9 and
10, Jamaica-st., Commercial-rd., u.t. 11 yrs.,
g.r. 11, 2, 350; By A. T. Whitmore & Co.; 1, 2, 3, 4,
cottages, High-st., Hampton Wick, r. 254, 350; By
Dyer, Son, & Hilton: "Park Lodge," Hervey-rd.,
Blackheath, u.t. 67 yrs., g.r. 151, 1,000; By Newson &
Co.; 12, Puckering-st., Ealing, u.t. 44 yrs., g.r.
62, 106, r. 482, 102; 108, Drayton-pk., Highbury, u.t.
81 yrs., g.r. 81, r. 40, 300; 13 and 21, Stavordale-rd.,
u.t. 84 yrs., g.r. 104, 600; 2, Margaret-st., Oxford-st.,
u.t. 23 yrs., g.r. 10, 100; 81 and 82, Upper Ogle-
st., u.t. 352, g.r. 144, r. 140, 950.

OCTOBER 28.-By A. W. Taylor & Co.: "Fieldholme,"
Queen's Ride, Barnes Common, u.t. 80 yrs., g.r. 202, 500;
120.-By J. Haden Chubb & Co.; 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
u.t. 23 yrs., g.r. 151, r. 352, 500.-By Norton, Trust,
& Gilbert: "The Mount," Shere, Surrey, 24 acres,
f. 2,000; four freehold cottages, 570; a plot of free-
hold land, 13 acres, 400.-By W. Bradley: 54, Sydney-
rd., Horsely, u.t. 91 yrs., g.r. 61, 63, r. 282, 1,050; 1
and 2, Laurel-gardens, Greenwich, u.t. 14 yrs., g.r. 252,
300; 68, Pelton-rd., u.t. 15 yrs., g.r. 23, 178, 200;
83, 85, 87, 88, Lower Chester-st., u.t. 26 yrs., g.r. 31,
310; 85, 86, Lower Chester-st., u.t. 26 yrs., g.r. 1, 128,
140; 30, Marlborough-st., and 29, Hoakins-st.,
u.t. 18 yrs., g.r. 151, 55; 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
Charlton, u.t. 30 yrs., g.r. 11, 178, 61, 95;
155 and 157, Hilder-st., Canning Town, and a plot of
land, f. 402; 180, 182, and 184, Hilder-st.; and a plot of
land, f. 526; 75 to 80, Stephenson-st., f. 1, 150.
(Communications use these rates.-E.g., for freehold
ground-rent; i.g.r. for leasehold ground-rent; i.g.r. for
improved ground-rent; g.r. for ground-rent; r. for rent;
f. for freehold; c. for copyhold; l. for leasehold; e.r.
for estimated rental; u.t. for unexpired term; y. for
years; p. for years; st. for street; rd. for road;
sq. for square; pl. for place; ter. for terrace; cres. for
crescent; yd. for yard, &c.)

PRICES CURRENT OF MATERIALS.

Table with columns: TIMBER, METALS, and other materials. Includes items like Greenheart, Teak, Iron, Steel, Lead, Zinc, etc.

BARNET.-For about 51 yards run of 8-in. pipe sewers with manholes, &c., for the Rural Sanitary Authority. Mr. W. H. Mansbridge, Surveyor, 140, High-st., Barnet.

Table listing names and amounts for Barnet project, including Waites, Bloomfield, Rother, Jackson, & Nicholls.

BARNSELY.-For the construction of an outfall sewer, &c., Heyland Common, for the Heyland Nether Local Board. Mr. W. Whitman, Surveyor, Town Hall, Barnsley, near Barnsley; George White, 2,097 6 0; James Trickett, 2,118 15 0; Frank Evers, 472 15 0; George Hall, 418 0 0; Headist & Whitson, 42 15 0. Accepted.

BELEFAST.-For the erection of a quay-wall, Lagan Bank-road, for the Corporation. Mr. J. C. Braywell, M.A.M.C.E., City Surveyor. Quantities by Mr. W. H. Stephens, Douglas-place, Belfast: K. Manly, 47,527 11 9; H. J. Martin, Ltd., 4,807 0 0; H. C. Broderick, 1,069 10 7; J. J. Henry, 4,891 0 0; W. Grawell, 6,000 0 0; Workman & Co., 2,000 0 0; Jno. Jordan, 2,088 0 0. Belfast accepted, 4,850 0 0.

BUCKFASTLEIGH (Devon).-For taking up and relaying 31 ft. lineal, and providing and laying 220 ft. lineal of 9-in. pipe sewer, &c., Buckfastleigh, for the Devon Rural Sanitary Authority. Mr. C. S. Acock, Surveyor, Exmouth, Devon. Quantities by Mr. C. S. Acock, Surveyor, Exmouth, Devon: J. H. G. & Co., 4,180 0 0; Shillcock, 275 0 0; Sabrow, Tynes, 75 10 0. Accepted.

CROFT WITH SOUTH-WORTH (Lancashire).-For the erection of a sewage-works, for the Lanchester Board of Health, Southworth, Mr. James Cawthorne, architect, Croft, Westmorland. Quantities by Mr. James Cawthorne: J. H. G. & Co., 2,285 10 0; William Palmer, Letch, Joseph & John Dalnith, 265 0 0. Lancashire accepted, 420 0 0.

DIRHAM.-For the construction of sewerage works, High Pit-lane, for the Rural Sanitary Authority, Mr. G. Green, Surveyor, 43, Western-hill, Durham. Quantities by the Surveyor: Thomas Dixon, 2,123 21 1; John Currie, Durham, 2,122 0 0. Durham accepted.

ELLAND (Yorkshire).-For sewerage, channelling, paving, &c., Beel-Street, for the Local Board. Mr. George Heyworth, Surveyor, 11, Bradford-road, Bradford. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Bell & Barnes, 2,531 6 4; James Rook, Ludd, Harrison & Barradour, 492 16 2. By (accepted), 2,445 0 0.

ENBORNE.-For works of restoration and new north side at Enborne Parish Church, near Newbury, Berks. Mr. James H. Money, architect, Newbury. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Woodbridge & Son, 42,271 6 0; George Elms, Marsh Ben, W. G. Acock, 2,169 10 0. Lancashire accepted, 22,109 0 0.

GREAT YARMOUTH.-For laying drains, &c., at the workhouses, for the Board of Guardians. Mr. A. S. Hewitt, architect, 10, Beaufort-street, Great Yarmouth. Quantities by Messrs. G. Cockhill & Son: 2,331 0 0; Messrs. G. Cockhill & Son, 2,325 0 0. Accepted.

LINCOLN.-For the erection of a farmhouse at South Causton, Lincoln, for the Rural Sanitary Authority, Mr. W. Watkins, architect, Lincoln. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: W. Wright & Sons, 1,115 10 0. Lincoln accepted, 1,143 0 0.

LINCOLN.-For the erection of technical workhouse, at the School of Science and Art, Lincoln. Mr. W. Watkins, architect, Lincoln. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: H. S. & W. Cook, 494 10 0; M. Otter & Son, 2,849 0 0. Lincoln accepted, 2,849 0 0.

LONDON.-For alterations to the "Old Red Cow," Long-lane, for the Rural Sanitary Authority, Messrs. Dickinson & Paterson, architects, & John Street, Adelphi, W.C. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Burnham & Son, 650 0 0. Accepted, 575 0 0.

LONDON.-For the erection of a shelter, Blackfriars, for the Rural Sanitary Authority, Mr. James Gordon, architect. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: T. Hooper, 1,256 0 0; Martin & Co., 1,154 0 0; F. Coakley, 1,349 0 0; T. Morgan, 840 0 0. Accepted, 1,973 7 7.

LONDON.-For repairs, painting, papering, &c., at the Religion Relief Office, Highway Mews, N., for the Guardians of the Poor of the Parish of St. Mary, Islington. Mr. William Smith, architect, 50, Chancery-lane, W.C. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Bates & Co., 240 0 0; Houghton & Sons, 2,202 0 0; Rhodes, 310 10 0; H. Stewart & Co., 192 13 4; Purser, 230 0 0; M. A. & H. H. & H. H., 191 0 0; Richards, 274 10 0; Methven Bros., 189 0 0; Smith, 275 0 0; Fagg, 189 0 0; Lawrence, 245 0 0; Shaw, 189 0 0; Peckham, 275 0 0; Stevens Bros., 178 0 0; Lyke & Son, 24 0 0; Denton, 173 0 0; Jones & Treble, 220 0 0; Kelly, 168 3 0; Ward & Laidlaw, 213 0 0; Kenney, 165 0 0; Dickson, 212 15 0; Derby, 149 0 0; Langham, 210 0 0; White & Sons, 148 0 0; Sheldrick Bros., 203 0 0; Sedley, 141 0 0.

LONDON.-For pulling down and rebuilding premises, Nos. 78, 80, and 82, Broadway, Strand, E.C., for Mr. F. R. Roberts. Mr. J. G. C. Cole, architect, Quantities by Mr. Edward S. Mansergh, 28, Mount-street, Grosvenor-square, W.: H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: G. H. & A. Broadbent, 5,500 0 0; Spencer & Co., 5,135 0 0; G. B. & W. Williams & Sons, 4,588 0 0; G. Minter, 5,800 0 0; B. E. Nightingale, 4,983 0 0; Harris & Wardrop, 5,341 0 0; G. B. & W. Williams & Sons, 4,282 0 0. Accepted, 4,282 0 0.

LONDON.-For the erection of new premises at Newington Green, N., for the Midway Rational Club and Institute. Mr. Alfred Allen, architect, 87, Old-street, St. Luke's, E.C. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Deering, 4,288 0 0; Bentley, 4,282 0 0; Lawrence & Sons, 3,870 0 0; Kilby & Gayford, 4,130 0 0; Sharnper, 3,580 0 0; Dove Bros., 4,130 0 0; G. B. & W. Williams & Sons, 3,580 0 0. Accepted, 4,282 0 0.

LONDON.-For re-laying No. 15, Market-trade, Wood Green, N., after fire, for Mr. W. F. Palmer. Mr. John H. Plender, architect and surveyor, Bridge House, South Tottenham. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: F. Voller, 2,890 0 0; H. S. & W. Cook, 2,890 0 0. Accepted, 2,890 0 0.

LONDON.-Accepted for kerbing, channelling, paving, &c., Kingston-on-Thames, for the Lewisham Board of Works. Mr. John Currie, Surveyor. John Mowlem & Co., Millbank, S.W. 4,839 0 0.

TENDERS.

Communications for insertion under this heading should be addressed to "The Builder," and must reach us not later than 12 noon on Thursdays.

Aspirina (Cumberland).-For the erection of two-rooms, boiler-house, &c., at the Public Hall, for the Aspirina Public Hall Company. Mr. Robert Bell, architect, Richmond Hill, Aspirina. Quantities by the architect: W. J. Williams, Stodolne & Lauchlin Bell, 417 17 6; S. S. Aspirina, 417 17 6. Accepted.

BARNET.-For road-making works, Stratford-road, for the Local Board. Mr. W. H. Mansbridge, Surveyor, 140, High-st., Barnet. Quantities by Messrs. H. L. Curtis & Sons, 119 and 120, London-wall, Manchester, & Co.: Kilmack, 219 0 0; Bell, 219 0 0; Jackson, 219 0 0; Nicholls, 148 10 0. Accepted, 148 10 0.

LONDON.—For fittings to bakers shop, No. 6, Spynons-street, Stone-square, S.W. Messrs. Pooley & Follett, architects, 21, John-street, Adelphi, W.C. —
 Charles Sprykerly £300 10
 Drew & Colman 295 0
 J. W. Moller 285 0
 W. H. Clark, 107, Gray's Inn-road, W.C. £275 18
 Accepted.

LONDON.—For pulling down and rebuilding No. 43, Queen Anne-street, W. for Mr. George Moulton. Messrs. George & Ralph Low, 47, Abchurch-lane, E.C. —
 H. B. Oldrey £2,000
 J. Eider 1,800
 A. G. Burton 1,500
 H. B. Oldrey & Ralph Low, 47, Abchurch-lane, E.C. £1,800
 H. B. Oldrey & Ralph Low, 47, Abchurch-lane, E.C. £1,800
 Accepted.

LONDON.—For the extension of the Poplar and St. Peter's Sick Asylum, Devon-road, Bromley-by-Law, E. for the Managers of the Poplar and St. Peter's Sick Asylum District. Messrs. A. & C. Harrison, Architects, 15, Leadenhall-street, E.C. Quantities supplied.—
 Real, Blight, & Co. £3,308 10
 Shilliton & Son 31,409
 Leslie & Co. 28,489
 Accepted and modified and reduced at £23,194.

MIDGLEY (Works).—Accepted for work in the erection of seven through houses, openwork rock garden, and honorary walk, for Thornycroft Lane, Midgley. Mr. T. L. Patchett, architect, Halifax.—
 Excavator, mason, and bricklayer (exclusive of stone, exterior, and interior work, ashlar, ironings, and flagging)—Thos. Pickles, Midgley 2680 0
 Carpenter and joiner—Edwin Mansfield Booth 280 0
 Plumber and glazier (exclusive of water and gas supply)—
 Wm. Alderson, Luddenden 40 0
 Alderson, Luddenden 106 10

OGMORE VALE (Glamorgan-shire).—Accepted for the construction of sewerage works. Gage rail, for the Ogmor and Garw Local Board. Mr. H. Dawkins Williams, Surveyor, Blackmill, Ogmor Vale.—
 David Jenkins, Oxford Joinery Works, Bwa sea £187 0 0

PONTYPOOL.—For the erection of six houses, Cwmffwrdd, for Mr. William Bush. Mr. George John Jew, C.E., architect, Ponty-pool.—
 Wm. Harris £1,150 10 0
 Ferguson & Hardy 960 0 0
 W. & A. Davis 960 0 0
 Accepted. [Architect's estimate, £260]

SOUTHAMPTON.—For supplying and fixing fittings at the Havelly Ice Station, for the Havelly Council. Mr. W. B. C. Bennett, Surveyor, Municipal Offices, Southampton.—
 W. & A. Davis £137 14 10
 Accepted. £237 10

SCRIBTON.—For the erection of a private residence in St. Andrew's-square, for Mr. L. J. N. Wood. Mr. R. Lano Pearce, architect, 106, Queen's Victoria-street, 1 Victoria-street, 1 Victoria-street, 1 Victoria-street.—
 J. & J. Jarvis £267
 Freuch & Edwood 550
 Accepted. [Architect's estimate, £267]

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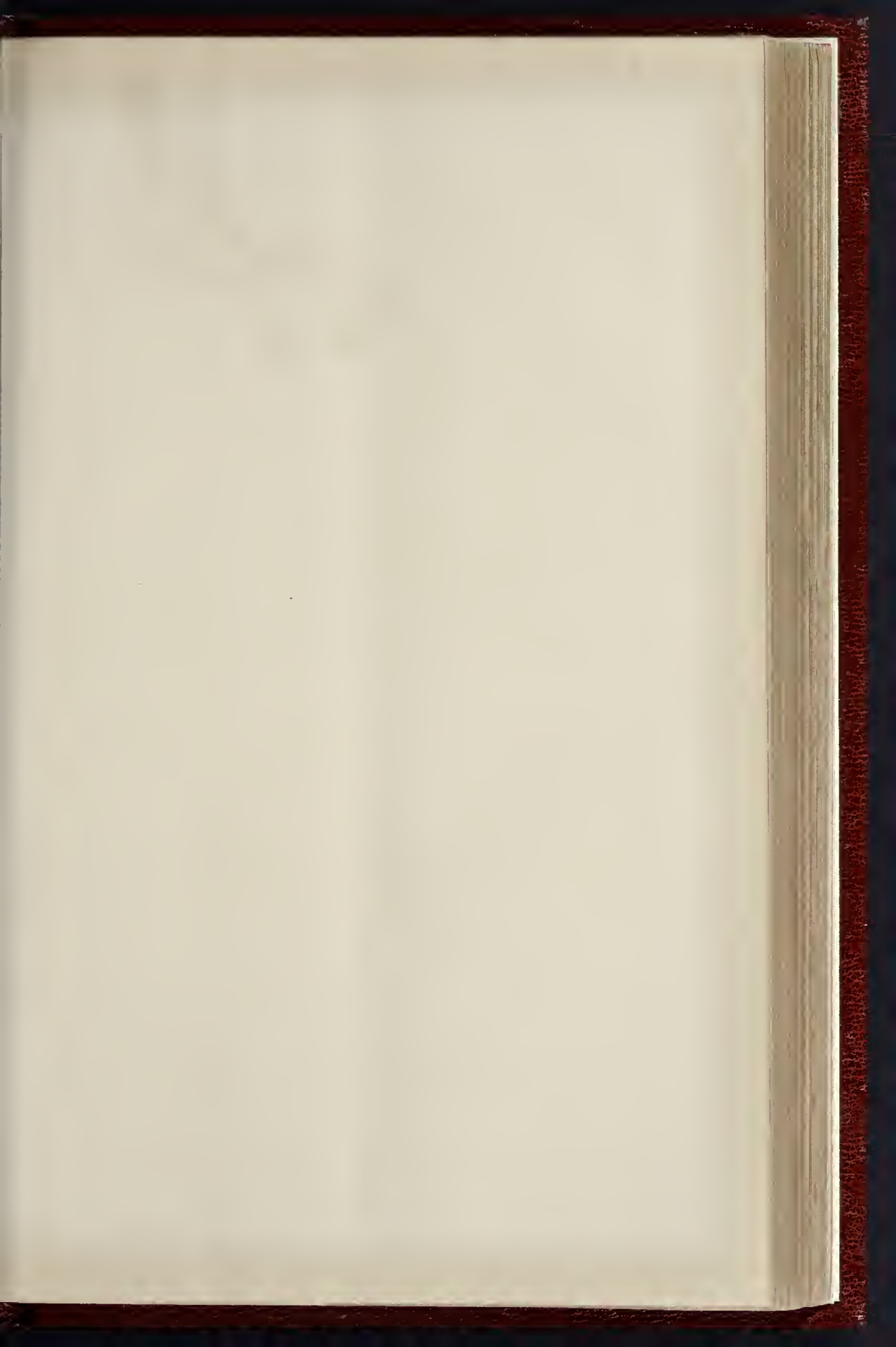
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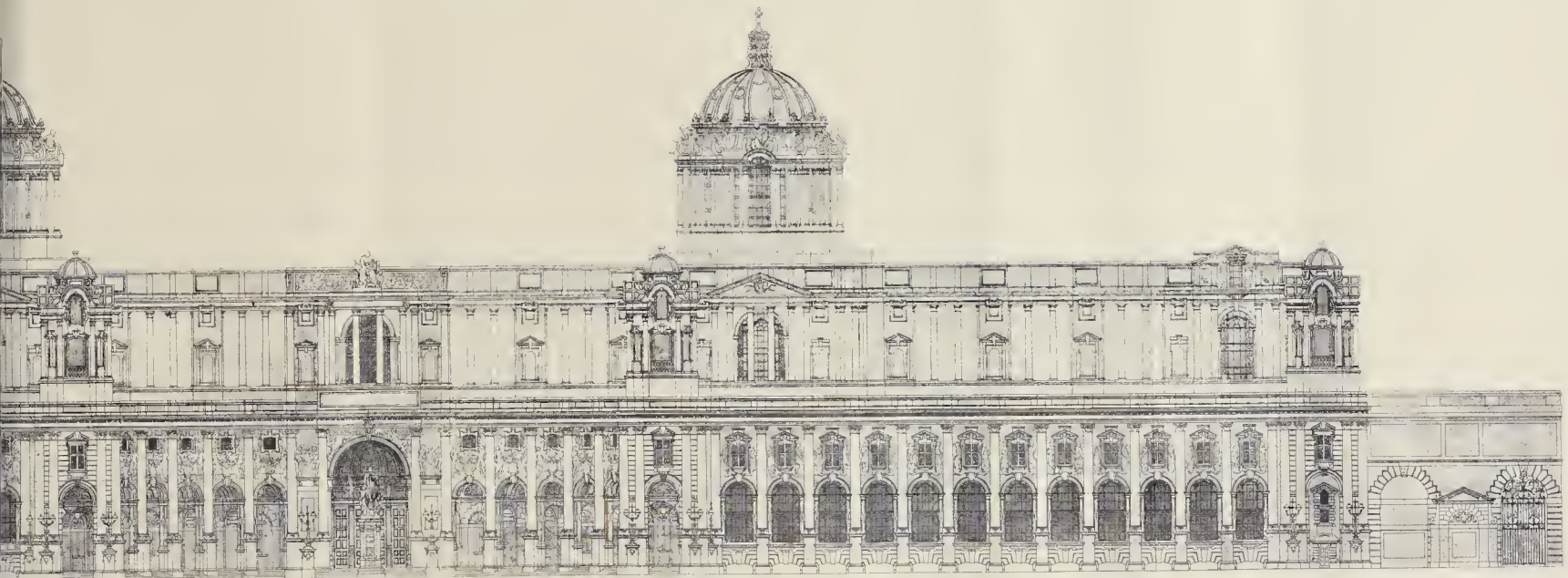
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DESIGN FOR SOUTH KENSINGTON MUSEUM ELEVATION TO CROMWELL ROAD—By MR JOHN BELCHER, F.R.I.B.A



The Builder.

Vol. LXIII. No. 257.

NOVEMBER 12, 1892.

ILLUSTRATIONS.

Design for South Kensington Museum: Elevation to Cromwell road.—By Mr. John Belcher, F.R.I.B.A.	Extra-Large Ink-Photo.
New Premises, Heath-street, Hampstead.—Mr. Keith D. Young, F.R.I.B.A., Architect	Double-Page Ink-Photo.
Sketch Design for Boat-house and Entrance Lodge.—By Mr. C. E. Mallows	Single-Page Photo-Litho.
A Vicarage in Surrey.—Mr. T. Maclaren, Architect	Single-Page Photo-Litho.
Bridge at St. Benet, Avignon.—Drawn by Mr. A. Needham Wilson, A.R.I.B.A.	Single-Page Ink-Photo.
Leaning Tower, Saragossa, now in course of Demolition.—From a Drawing by Mr. Heber Rimmer	Single-Page Ink-Photo.

Blocks in Text.

Plan of Mr. Belcher's Design for Completing South Kensington Museum	Page 378	Plan of New Dairy Premises, Hampstead	P. 383
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The Explosion of Range Boilers.



THE approach of winter brings to mind the fatalities and disasters that annually occur from the cause which forms the subject of this article. It is not that every cause of these serious accidents has any relation to cold; in fact, there is only one cause, but this one is the most prolific, for at least four-fifths of the explosions are directly traceable to frost. The causes which lead to explosions are—1, Frost; 2, failure or shortness of (sometimes due to frost); 3, stoppage; and 4, incrustated deposit. These four are placed in their order of virulence. It is a doubt whether the second and third need not be put upon terms of equality in order to the degree of danger their existence creates; but, as regards the fourth, there is no danger at all traceable to it, standing the alarming advertisements to the contrary. In ranking these causes in the order of citation, one of the ways by which frost can cause an explosion is by solidifying, i.e., freezing, the water in the two circulating pipes that lead from the boiler, so that any steam generated cannot escape. The general principle of every apparatus is supposed to be provided for by an open pipe at the highest point. This pipe should allow free escape for steam, and is also intended to allow for the expansion of water as it is heated: it is, in fact, usually called the expansion pipe. This pipe at the top is efficient in preventing expansion as long as it is open or there is a clear passage through the pipes from this point down to the boiler, as there always should be. If, however, any part of this pipe or the circulating pipes between it and the boiler be incrustated in places where frost can act vigorously upon them, there is every probability that during the six or seven hours at night when the fire is out, the water may be cooled down sufficiently to freeze. If the frost can act in this manner and the water is frozen hard in one or four or more feet of pipe, the open

pipe at the top is of no avail, as the passage between it and the boiler is cut off, and no other escape for steam, &c., exists. In such a case as this we may, theoretically, look for an accident to occur; but fortunately there are several incidental chances that may ensure safety. When the steam escape-pipe is practically closed by ice in it, or in the circulating pipes below it, there is certainly no escape for steam if it is generated, nor is there room for expansion. Before, however, an accident of any kind can occur, we have to get the water at a high temperature, and this, with the time it occupies, is an element of safety. First, the gradual heating of the water may melt the ice in the pipes; and if it is warmed ever so little it will melt sufficiently to be loosened by the expansive force of the water as it gets heated. If it moves, then safety is assured, as it will quickly melt. Secondly, some one may go to a tap and at once discover that something is wrong; this is an element of safety, as everyone who knows the danger of frozen pipes would immediately extinguish the fire. Undoubtedly very many disasters have been avoided by these little incidental circumstances, and during the severe frosts of last winter there is no doubt some scores of kitchen fires were lighted when it was highly dangerous to do so. Sometimes only one of the circulating pipes gets frozen, and then there is no danger; but as it is usual for both pipes to be run side by side, they generally fare alike. When the apparatus is upon what is known as the Tank System, with the hot-water reservoir or tank at the top of the house, a danger exists if the frost attacks the cold supply-pipe alone. If this pipe is frozen up, the hot-water apparatus is no longer furnished with cold water as fast as the hot is withdrawn. The first intimation of this is that water cannot be obtained from the hot-water taps, and this means that the apparatus has been emptied down to the tap in question. This is a serious matter, and the fire should be extinguished at once, until water runs freely at the taps, or, in other words, until the cold supply-pipe is clear again. If the fire is not extinguished there is a considerable likelihood of an explosion, for what little water is in the boiler and pipes will be quickly evaporated, and the

boiler will get red-hot. The red-heat of the boiler is not dangerous in itself, but if from any cause the frost-bitten pipe should suddenly run free again, and water enter the boiler while the latter was red-hot, the result would be disastrous to everything near it. This particular way in which an accident can occur is the one which without doubt has caused three-fourths of the fatalities on record. When a boiler bursts owing to the steam outlet being closed, the explosion is not of nearly so serious a nature as that from water flowing into a red-hot boiler. With the latter it is the effect of steam in its enormous expansive and rending force that does such serious hurt. With the former it is a burst and not an explosion in the true sense of the word. With the general freezing of cold supply-pipes that occurred in the last severe frost, the wonder is that accidents did not reach alarming numbers, instead of being so few. Of course there is scarcely a person who would be so injudicious as to continue working a range when the taps plainly indicate that the apparatus is short of water. The remedy for all this is, of course, to prevent frost attacking the pipes. If pipes are run in sheltered places, where the temperature does not fall below freezing-point to any serious extent, no freezing can occur to the water sufficient to be dangerous. It is, however, of very little good caring for seven-eighths of the pipe if one-eighth is left so that frost can attack it successfully. This is frequently the case, the pipes in many instances being snugly cased and packed down in the house, while several feet are left uncared for in the roof. The cold-supply pipe, which is of so much importance, and the steam-escape pipe (also an important detail) are generally in as cold positions as they can well be placed in. Unless there is a cistern-room, some part of both these pipes will probably be exposed in a cold roof, where the cisterns are. If pipes cannot be placed in fairly warm situations they should be covered with some material to keep them warm, that is, to prevent their losing heat. Hair felt, which is inexpensive, is a really good material, as it most nearly approaches what nature has provided to conserve the heat in living things. Some say that the warmth of a hot-water

pipe within this material is conducive to the production of insect life. This may have occurred in some instances, but it is not usual. A material which cannot have this effect, but which is well adapted for preventing loss of heat, is silicate cotton. The only disadvantage of this material is that it is not made in sheets or strips for winding on pipes; it is necessary to encase it. Almost any material of a woolly or grassy or woody nature will answer fairly well. Sawdust, carpet, cloth, hay-bands, and such like, will all aid in keeping out frost, but hair-felt or felt-carpeting should be used if possible; not in one thickness only, but in two or three thicknesses,—say, $\frac{3}{4}$ in. thick. If a pipe is put in a casing, it is worse off than before if the casing is not packed tight with some materials such as those named. Pipes in a case without any packing-material are worse off than exposed pipes, owing to the current of air that sets up within it, particularly if the casing be vertical or sloping. This applies to both cold and hot water pipes, but more especially to the latter. When hot-water pipes are carried up outside a house, as they are sometimes (not a commendable practice if there is a possible way of avoiding it), the encasing and packing becomes of considerable importance, as it must be done thoroughly. The casing should be large enough to admit of at least $1\frac{1}{2}$ -in. of packing-material surrounding the pipes. Properly speaking, there should be some packing between the pipes and the wall, for if by any chance the casing warps, or comes away from the wall, the fissures so caused will lead directly to the pipes, and do all the harm possible.

So far we have spoken of the effect of frost in attacking the hot-water pipes, and in causing shortness of water by freezing the cold-water service. The particulars given in this latter case apply in just the same way when the failure of water proceeds from any other cause. In towns and places supplied by a water company the water supply is as regular as could be wished; but in outlying districts it is not so, and hundreds of country residences rely upon a gardener's attention to a pump, which commonly makes the supply very irregular indeed. In such houses it is no uncommon thing for the cistern to be emptied, not perhaps in the regular way, but when, on exceptional occasions, there is a greater than usual quantity of water used. With that system of hot-water works in which the tank or reservoir is at the highest point, there is every possibility of danger occurring, as the apparatus requires to be emptied before any shortness of water is indicated. With the pipes erected on what is known as the cylinder system, all the draw-off services are taken from above the reservoir, and this latter cannot be emptied. The result of this is that shortness of cold water supply is an inconvenience only, for by this plan there remain some 40 or 50 gallons of water in the apparatus after the taps cease to yield any, and the cylinder system should therefore always be adopted in residences that have an uncertain supply of water.

The next cause of explosions,—stop-cocks in main circulations,—is only less prolific of trouble than the last, due to stop-cocks not being in common use for this purpose. If it was the regular thing to put stop-cocks in the main circulating pipes, the number of accidents would be very large. It is a dangerous practice, and condemned by every practical man. What leads to people having stop-cocks so placed is the idea of saving labour and nuisance when the boiler has to be opened for cleaning purposes or repair. By means of stop-cocks so fixed, all communication can be cut off between boiler and tank when desired, and it would be possible to remove the old boiler, and replace it with a new one, without emptying the tank. It, however, must be repeated that the introduction of stop-cocks in these pipes is very dangerous, and should be avoided. One of the last recorded fatalities from boiler explosion was due to these. The plumber who closed them when he opened the boiler

to clear it of deposit, omitted to open them when he had finished his work and lighted the fire again. *He was killed.* This was the result of stop-cocks in the hands of a "practical man." It is therefore easy to imagine what may happen if they are meddled with by inexperienced persons. When stop-cocks are not used it becomes necessary to empty the whole apparatus when the boiler is opened, but this is very little trouble, after all. An emptying service should be provided, but the tap should have a loose key, and only be used for actual emptying purposes. It may be added that there is no danger in putting a stop-cock in one pipe only, as one clear pipe will suffice to prevent a disaster.

The next and last cause of boiler explosions, pipes choked with incrustated lime deposit, is a possible cause, certainly, although it is doubtful if such a result has ever really taken place. In the first place, it is unusual for both circulating pipes to become furred seriously. The furring of the flow-pipe is very frequent, and occasionally (rarely) a section of this pipe is found quite solid with deposit. The return-pipe does not fur up so quickly, and the element of safety is the fact that when the flow-pipe becomes partially choked the apparatus gives out alarming noises and vibrations. The result is that weeks, and sometimes months, before there is any real danger the noises have necessitated something being done, as they simply frighten people. It has to be admitted that if the furring did not bring about these significant noises it would be the commonest cause of danger possible, and we should almost daily hear of accidents from this cause. The warnings, however, do occur, and before the pipes are choked to an actually dangerous extent they become quite unbearable. In this fact lies safety, for the collection of deposit is very gradual, and it never occurs suddenly.

The remedy for all these dangers is a safety-valve, but there should be some care exercised in this. A safety-valve cannot usually be put direct into the range boiler, and has, consequently, to be connected thereto by a pipe. It is better to have a distinct pipe for this rather than use one of the circulating pipes, as a pipe which has the water almost stationary within it is less liable to fur than one of the circulating pipes. This should also be of good size, so as to ensure its keeping clear and not being choked with deposit; and the shorter it is the better.

Safety-valves are of several kinds, but those most commonly used for this work are two, viz., the spring and the dead-weight. There are about as many used of one as the other, some people favouring the latter to the prejudice of the former; but on the only two occasions coming under the writer's experience, in which safety-valves were the means of preventing disasters, they were both of the spring variety. With the spring-valve the seating is a flat surface, and it is said that in course of time one flat surface against another (vulcanite or composition against metal) will become firmly fixed, and would not come apart or open when relief was required. Certainly, in course of time these surfaces do stick together, but it is doubtful if they would ever become so securely attached as this. With the dead-weight valve the seating is a knife-edge of metal against a flat metal surface, and there is undoubtedly less likelihood of union between two surfaces such as these. This latter valve is larger than the other, but this is no particular fault in a general way.

Considering the comparatively small expense, it should be a more prevalent practice to put safety-valves to range boilers than it is. It is quite a simple matter when the range is being fixed (although not so easy afterwards), and safety is thus purchased at little cost. Certainly dangers from the causes named are rather rare, or perhaps it is better to say accidents are rather rare; but when they do occur they are of such a terrible kind that really no boiler should go without this means of safety in emergency.

There is a kind of safety appliance known

as a "fusible plug." This, although in principle, has met with little favour; it must be admitted that it is not suitable use in boilers that have to heat hard water. With these waters, which cause an incrustated deposit, the plug would probably get furred, and this would vitiate its action.

NOTES.



THE President of the Institute of Architects may be congratulated not only on a very able and comprehensive discourse, but

having made what is certainly one of the best points ever made in a presidential address, in his criticism on the illogical and costly method in which the serial publications of the Institute are carried on. It is common and a rational method for societies of that kind to print reports of separate meetings which can be bound up and form a complete record at the close of the session. The Institute method has been to put one form of report immediately after another meeting, and another form of report at the end of the session, thus producing its record double, to a great extent, and increasing the cost of production and the "making of many books." If the *Journal of Proceedings* contained only a brief summary of the meetings to keep members informed of what was going on until the publication of the session volume, there would have been more room in it; but the President pointed out that while in the *Journal* the papers are summarised and the discussions given in full, in the *Transactions* the papers are given in full, the discussions summarised, so that the publication gives a full report of any meeting. To only draw attention to such an amount seems sufficient to cause its repression, and the reduction of this double but not duplicate publication to one series would mean a saving of 500*l.*, we hope that in case there will be some funds to devote to that portion of the Library which is at present most inadequately provided, foreign magazines and publications connected with art and architecture. Attempts have been made for twenty years back, for instance, to get the *Gazette des Beaux-Arts* into the Library, a publication which is a perfect mine of valuable information and illustration in regard to decorative art, architecture, and which goes on improving year by year; but all to no purpose; and the absence of the leading German archaeological publications is equally a defect which ought to be remedied.

IT is satisfactory to learn that the arrangements connected with the formation of the Chamber of Arbitration to be established under the auspices of the London Chamber of Commerce and the City Corporation are nearly completed, and the scheme is about to become an accomplished fact. The details which have been published show that considerable care has been taken to ensure the efficiency of the tribunal, and to render its decisions as authoritative as possible. The procedure will be very similar to that of a court of law, the legal assessor and other principal officers being barristers or solicitors familiar with London commercial practice. The list of arbitrators will necessarily be very large, having regard to the varied nature of the questions with which the Chamber will be called upon to deal; but all will be fully approved by the Court of Common Council. So many of the lamentable disputes of recent years might obviously have been avoided if a court of this nature that its future utility cannot be doubted. There will be an elasticity about it which will permit of disputants availing themselves of it in cases which could hardly have been submitted to a tribunal in which the methods of procedure and the choice of arbitrators would have been more limited. For instance, a case may be mutually prepared by the parties interested, and laid before a single arbitrator or two arbitrators and an umpire will

vided, before whom the parties may call (nesses, and proceed in accordance with the general law of arbitration. The formal inauguration of this Chamber, which has been fixed for the 23rd inst., may mark an important epoch in the commercial life of the metropolis. The President of the Board of Trade, who will take part, speaking at the Sheffield Cutlers' Feast last week, declared at internal industrial peace was at this moment of vital importance to the prosperity of this country. He said that anything he could do in the department over which he presided to facilitate the settlement of disputes of this nature, or to prevent them, if possible, should be considered by him a matter of bounden duty. Mr. Mundella was notably referring more especially to disputes between capital and labour; but the inauguration of this tribunal may be looked upon as a step in the direction indicated, as our trade and commerce have neither time nor money to spare in needless disputes, of whatever nature.

ON Friday, the 4th instant, Dr. Tristram, B.C.C., sitting in the Consistory Court, St. Paul's, granted a faculty for the entire removal, at a computed cost of 2,000*l.*, of the man remains from beneath the Church of St. Mary Woolnoth, Lombard-street. It was stated in Court that the parishioners had subscribed 700*l.*, and the Charity Commissioners had spent 1,200*l.* in cementing the vaults, but to no purpose, the nuisance continuing, so that the church had to be closed ten months ago. We have already commented upon the insanitary and, in that respect, highly dangerous condition of the church, which it is as foolishly contemplated to remedy by pulling the building down. The removal of the remains can, at this distance of time, hurt the susceptibilities of no one; and we are surprised that so obvious a measure was not sooner applied.

AN important question connected with the Railway and Canal Traffic Act of 1888 is the publication of intended increases in tolls. The Act alluded to conferred a great benefit upon the trading public in laying down definite regulations for the due notification of all such advances, the clause requiring the companies to give "by publication in such manner as the Board of Trade may prescribe at least fourteen days' notice of such intended increase, stating in such notice the date on which the altered rate or charge is to take effect." As a further guarantee it is enacted that "no such increase in the published tolls, rates, or charges shall have effect unless and until the fourteen days' notice required under this section has been given." Now, we have on the authority of Sir George Findlay that on January 1 next "millions of old rates will be cancelled and new ones issued"—that is to say that, in order to ensure all the charges being within the new Parliamentary limit, the existing rate-books are to be entirely swept away, and replaced by fresh ones based upon the authorised schedules. Therefore, even if a large proportion of the old rates are reinstated or reduced, the number of alterations necessitating public notice might still run into hundreds of thousands. It is somewhat reassuring to find Sir George Findlay stating last week, at a conference at the Board of Trade offices, that there would be but little alteration, as they had been endeavouring to frame the rates in such a manner as to avoid materially advancing them. Still, it is essentially necessary that manufacturers and others should be advised of all advances affecting them, and the question is being carefully considered by the Board of Trade with a view of devising a plan for making the required information public. The subject is also occupying the attention of Sir James Whitehead's organisation,—the Mansion House Association on Railway Rates.

AMONGST other bequests by the late Mr. Thomas Nelson, publisher, Edinburgh, is one of 50,000*l.*, to be expended in the erection and maintenance of "rests" for

labouring men, where they can spend their leisure hours in reading, smoking, and conversation. According to his directions, the buildings are to be erected in Canongate, High-street, Grassmarket, and Cowgate, and are to be of one story in height, similar to the folding-room in the publishing works at Parkside; and they are to be plain, unadorned structures. The restriction of the buildings to one story makes their erection directly on the lines of thoroughfare named prohibitive, and they must, therefore, be relegated to closes or back courts,—an alternative much less desirable than if they were brought to the front with two or three stories above. Ample light and ventilation can be provided in such circumstances, and it is fortunate that some discretion is left to the trustees in carrying out the testator's will.

THE purchase having been completed (see our "Note" of July 16 last), West Wickham Common will be formally opened to the public to-day by the Lord Mayor. In compliance with a memorial of the inhabitants, the Board of Agriculture, acting under the Metropolitan Commons Acts, 1866-78, have framed a scheme in respect of Darrick, Broomhall, Gumping, and Sparrow commons at Orpington, in Kent, providing for the laying out of the land for public resort and enjoyment. This parish, together with West Wickham, was once owned by Odo, Bishop of Bayeux, who, however, in the convulsion held at Pinenden, 1076, was forced to surrender the property he had wrested from the monks of Canterbury. Sir Percival Hart entertained Queen Elizabeth at Orpington on July 22, 1573. From the Harts it passed by marriage to the Dyke family. To pass to another and a now purely urban locality, we may mention that, under the Open Spaces Acts, the burial-ground attached to the Holloway-road Chapel-of-ease will be taken over from the vicar by the Islington Vestry, for maintenance as an open space accessible to the public, subject to licence by the Bishop of London. In regard to the forty acres at Brockley, known as "Hilly Fields," to which we adverted in the "Note" already cited, we read that it is proposed to purchase the interests of Mr. Lee's trustees and the New Land Development Company, for 36,350*l.*, thus leaving a balance of 3,357*l.* for the further liability of purchasing four acres of land from the Ecclesiastical Commissioners for 4,000*l.* It is also stated that the purchase-moneys (13,000*l.*) for Bostall Woods, Plumstead (fourteen acres in extent), is now forthcoming, the London County Council having contributed one-half. The land belongs, we gather, to Sir Julian Goldsmid. The Metropolitan Public Gardens Association have opened to the public Spitalfields Churchyard, and the Great Church-lane Recreation Ground, W.; they have begun to lay out similar spaces at Duncan-terrace, Islington; Marigold-street (a gift); Victoria Park Cemetery; and Goldsmith-square.

THE London County Council have undertaken to restore, under the direction of Mr. Blashill, Lauderdale House, which, together with its own terraced and old-fashioned garden, is now included in Waterlow Park, Highgate. The Park, as our readers will recollect, consists of 29 acres, the gift of Sir Sydney Waterlow, to which he added 6,000*l.* for the purchase of the freehold of a portion,—2½ acres,—then held on lease. The Council voted 4,900*l.* to defray the cost of adapting the grounds for public resort. The house was the home of John, Duke of Lauderdale, and, it is said, of Nell Gwynne. Next northwards stood a cottage once occupied by Andrew Marvell. Views of the two premises as they appeared about fifty years ago are contained in the Archer and Twopenny collections at the British Museum. Nearly opposite Marvell's cottage, on the roadside bank, stood Arundel House, since rebuilt, where Bacon, attended by Sir Julius Caesar, closed his life, and whence, on June 3,

1611, Lady Arabelle Stuart escaped in what proved to be an unsuccessful effort to rejoin her husband.

THE new harbour at Hamburg has been the scene of a fourth disastrous fire since its opening, and, as before, the confidence placed in the elaborate "fireproof" construction employed in its warehouses has been misplaced. This time the structural defects have not only caused an enormous loss of property, but also a long list of casualties, including the death of the chief officer of the fire brigade in attendance. In the construction of the Hamburg warehouses much importance was attached to the horizontal division of the different risks with the aid of girders, bricks, and concrete, whilst in the new Bremen Free Port this division is solely by means of timber-work. Whilst in the one case the intense heat of fires originating on one of the floors caused even well-protected ironwork to expand and collapse, whereby whole blocks were gutted, the timber-work has withstood similar strains exceedingly well, and in no case has the conflagration extended from one risk to another. The greater efficiency of the Bremen fire brigade must, of course, be taken into account, but only to a certain extent, as the warehouses they have to deal with are considered to be more dangerous than those at Hamburg.

AMONGST the collection of shooting galleries, billiards, skittles, confectioners' stalls, type-writing machines, &c., now on view at the Agricultural Hall, and dignified by the name of "The Engineering Exhibition," we notice but very few good exhibits of an engineering nature, and nothing very novel. There are a number of gas-engines, unfinished stalls, and unoccupied chalked-out floor spaces, and here and there well-known engineering firms are represented by the stock exhibition attendant,—in charge of three or four exhibits,—and who knows nothing about either of them; but the engineering element is absent from the exhibition as a whole. A recently-introduced series of Swiss marbles is certainly a redeeming feature, and occupies a prominent position, but it is difficult to understand their connexion with engineering. The fact is that, as we have said on former occasions, periodical exhibitions of this kind are well-nigh played out. As a rule they are run on purely business lines, and the enterprising promoter is not very particular who exhibits at them, provided he can induce the exhibitor to take a space at a remunerative figure. We do not know whether the exhibition now referred to was got up on this principle or not—whether it is merely a private speculation or a *bona fide* attempt on the part of people interested in engineering to get together something really representative of the industry; but a more miserable failure of an "engineering" exhibition it would be difficult to conceive.

OUR attention has been drawn by Professor Aitchison to the fact that the *Architectural Record* (New York) is coolly reprinting in full his Royal Academy lectures on Byzantine architecture from our columns. There is of course not a word of recognition of the *Builder*. We may point out that these lectures were not published in the English press generally: they were given by Professor Aitchison for publication in this journal only, in which (with a few exceptions) the architectural lectures by Professors at the Royal Academy have for many years back been published in full, and were not intended for publication generally. As far as we are concerned the American journal in question might have been at full liberty to republish them on the simple condition of stating to what source they were indebted; but without Professor Aitchison's permission no one had any right to further invade his literary property. It seems hopeless to look for common honesty in these matters from most American journals; but if we have the pleasure of printing any further Royal

Academy lectures by Professor Aitchison, we must see if means cannot be taken to safeguard them against the assimilating propensities of American editors. If not, we fear it may be necessary for the Professor, in his own interests, to decide against their publication until the time comes for their more permanent publication in a book form which we hope we are to look for.

MAGAZINES AND REVIEWS.

THE *Gazette des Beaux-Arts* starts with an article on the Renaissance sculptures at the Obélisque de la Bastille d'Urfé, representing, it is suggested, a special school of local sculpture. It is illustrated by engravings of some fine works and sculpture. An article by M. T. de Wysewa on the exhibition of "Les Arts de la Femme" at Paris follows. "Barne Jones, Décorateur et Ornamentiste," is the subject of an enthusiastic but just and well-balanced article by M. Paul Leprieux, illustrated by a fine engraving of "The Wine of Circe," which he praises especially for the composition (in a decorative sense) and the fine choice which the painter has made of the right moment of illustration, that of the mixing of the fateful draught while the approaching vessels of Ulysses and his company are seen through the open window. In concluding, the author remarks that it is by long and severe study that Mr. Barne Jones has attained his great decorative quality of design, a lesson to those who "dans leurs cercles fermés et leurs petites coteries, n'ont le plus souvent que des présentations creuses et un art avorté." "Le portrait miniature en France" is continued by M. Henri Bouchet, with three charming chromolithographs of children by Fragonard. The museums and art publications of Holland are the subject of an article by M. Emile Michel.

The *Art Journal* contains an article on "Recent Fashions on French Art," by Marion Hepworth Dixon, dealing in the first instance with the remarkable feeling and method of M. Henri Martin, to which the writer does what may be called rather grudging justice. The Birmingham Art Gallery is the subject of a well-illustrated article by Mr. Candall. An article on "Mr. Logg's Hall and Lincoln" is illustrated by a reproduction of his clever picture of "Lord Mayor's Day." Birmingham is again noticed in Mr. Aymer Vallance's article on a provincial school of art, with illustrations of some very good decorative designs by its students; and Mr. Claude Phillips contributes an article on Raphael's "Crucifixion."

The *Art Annual*, the annual number of the *Art Journal*, is devoted to the works of Mr. Herkomer, prefaced by an admirable engraving of "The Last Muster," and another of the noble portrait here entitled "Entranced," though we think that was not the title under which it was first exhibited. There are numerous other illustrations.

The *Century* includes an article on "A Russian National Artist," Répin, by Miss Isabel F. Haggood, with illustrations from some of his works.

Scribner opens with the seventh article on "Great Streets of the World," in which Mr. Henry James deals in a worthy manner with that ever-fascinating subject "The Grand Canal." Mr. Brownell's third article on French painting deals with the modern realistic school, and he defends Monet for his system of painting the shadowed portions of a landscape with full detail, leaving nothing to form an adequate contrast with the lighted portions. We can only say that we entirely dissent from both painter and critic. We have no sunlight to paint with, and to fill in all the detail in shadow is simply depriving us of the sunlight, and making a picture which is true in one half of its detail at the cost of being false as a whole, and that is the general impression the landscapes of the *plein air* school give us. They are nature with the sunshine taken out.

Harper's gives an article on "The Holy Places of Islam," by Mr. E. Dudley Warner, with some adequate illustrations; Mr. Theodore Child describes the Parisian boulevards, with illustrations by A. Lepère and P. Renouard; and an article on "The Designers of the Fair" deals not, as the title would lead one to expect, with painters of "types of beauty," but with the architects of the Chicago Exhibition buildings, whose portraits are given, accompanied by a good deal of talk about the manner in which the artistic and architectural work has been carried out, which seems to have been good and

sensible in itself, but which is described and dwelt upon as if architects and decorators had never worked together on an exhibition building before; in fact, as if Chicago had invented art.

The *Fortnightly* contains a cosmical article by Mr. A. R. Wallace on "Our Molten Globe," giving some details as to the history and present condition of the globe on which the human race has formed what seems now to be regarded as but a temporary development. The late Duke of Marlborough contributes a rambling but pleasant article on "A Future School of English Art," including a rhapsody on Mr. Barne Jones, whom he describes as "the Wagner of painting."

— "Powers
Eternal! such names mingled!"

We should have thought no two names in art could be cited which awakened such opposite associations, and they are neither of them as great as the Duke imagined. But we sympathise completely with his amusing comparison between the Renaissance painters and the Cook's tourists who look at their great energetic works, so full of life; and also with the following remarks in regard to the proposed Gallery of English Art:—

"Now there is a popular fallacy that pictures are the only form of modern art which should be represented in a national collection. This is distinctly wrong. Every form of handicraft representing dexterity of the hand in elaborating the conception of the brain, has a right to enter the lists. Architecture is a most noble art, and depends on a power of design, a sense of proportion, and a general feeling of love for the magnificent and the beautiful in structure. Embroidery, lace, porcelain, gold-work, and notably bronze, as applied to figures and statuary, engraving of all sorts, and hundreds of other handicrafts which I could mention, have a right to artistic competition. The age is one of machinery, and machinery, though one of the greatest blessings of our time, presupposes the very converse of art. Hence the educational value of a national art collection is that it has no relation whatever to mechanical processes. Individuality of execution should be displayed in every object of art constructed. A modern South Kensington of the work of the best artists of the age would be the most useful national museum for the people. I fear if we were to endeavour to construct such a museum to-day it would puzzle the Mr. Bates to find the objects with which to fill it. Now I will take one specimen of what I mean. Look at that municipal gold chain which was made for Preston (I think) by Mr. Gilbert last year, and his small statue in silver of Victory the year before. Here are two works of contemporaneous art of considerable merit. Could we, in the field of book-binding, say, or wood and ivory carving, find anything to put alongside of these so as to make a beginning?"

The *Fortnightly* also contains an article on the "Woman's Art Exhibition at Paris," by "A Frenchwoman," who sums it up as incomplete and one-sided, and thinks it rests with England to take up and carry out such an exhibition in a more complete manner.

The *English Illustrated* gives an interesting article on "The Green-room of the Comédie Française" by Mr. Frederick Hawkins, with illustrations from some of the portraits of past celebrities, and one on the "Cries of London," in which a number of old engravings of our ancient street tradesmen are reproduced.

In the *Nineteenth Century* Mr. Huiuh gives an article on the question "Whence comes the great Multitude of Painters?" Mr. Chamberlain contributes a long one on the labour question, to which we may give more detailed attention than we can in these passing notes.

The *Magazine of Art* is a very interesting number, and includes a short article by Mr. Tadema on "Art in its Relation to Industry," the keynote of which is that art and industry are inseparable. We should not be disposed to accept entirely Mr. Tadema's remarks on the origin of some of the features of Greek architecture, but he quotes a very interesting remark made to him by Sir William Siemens, to the effect that the delicately diminishing form of the Greek column was the exact form for carrying power arrived at by most modern engineering calculations; and Mr. Tadema remarks on this that "the constantly progressing feeling for proportion, through many generations of first-class architects, ought to lead at last to a sense of safety and strength which is equal to calculations;" a suggestion which will hear a great deal of thinking over. Mr. Walter Armstrong contributes an article on "Drawings in the

British Museum," accompanied by many illustrations of varied interest. The "Leicester Corporation Art Gallery" is treated by Mr. Viccars, with illustrations from some of his pictures; Mr. Harry Furniss writes on "Originality in Pen-drawing and Design," and Canon writes a short letter, "A Word to Young English Painters," exhorting all who come to study in France (which he rather encourages them to do) to use their study for purpose of developing their English art, in becoming French artists. M. Canon should write similarly to young American artists: they need it more.

From the introduction to the first number of the *Philadelphia Journal of Architecture*, published eight times a year (why eight?), we understand that its object is educational, "to encourage and advance the study of architecture pure and simple." It is a small and delicately got-up publication containing some good illustrations of Greek architecture, a two or three short but thoughtful essays, as appears altogether to be a very good little publication.

The *Antiquary* contains a review of Mr. Percy Stone's "Architectural Antiquities in the Isle of Wight," and (among others) papers on "Coped Stones in Cornwall" by Mr. A. G. Lambdon (who has published something on the subject in our columns), "British and Roman Roads in the East Riding of Yorkshire" by Mr. Rev. E. M. Cole, and "Holy Wells," by Mr. R. C. Hope.

To the *National Review* Mr. B. H. Thwaites contributes an article on "London Fog; Scheme to Abolish it," no new scheme, merely the recommendation of gas fires in place of coal, which has been often advocated. We are entirely in favour of gas fires for cooking which would do away with a good deal of smoke. In regard to the others, it means giving up the most cheering indoor object in winter. The article contains some useful statistics.

Blackwood includes an article on "London After the Great Fire," in which Wren's ideal for rebuilding are characterised as "vast but impracticable," of which we feel by no means sure. In the course of it is some information as to the "first jerry-builder," one Barchon who is said to have flourished in the rebuilding of the City, and some of whose houses fell down.

The *Revue des Deux Mondes* contains a long article on the Paris sewage question, summing up in favour of the Achères scheme and taking the sewage on to the land: "c'est le coup d'argent, dira peut-être quelqu'un. Préferez-vous la fièvre?" concludes M. Flénay, whose name is appended to the article.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS:

THE PRESIDENT'S ADDRESS.

The opening meeting of this Institute for the session 1892-3 was held on Monday evening last at No. 9, Conduit-street, the President, Mr. J. Macvicar Anderson, in the chair.

Nomination of New Members.

The secretary, Mr. W. H. White, read a list of nominations for election to membership in the Institute, thirteen gentlemen being nominated as Fellows and eleven (all of whom had passed the Examination in Architecture) as Associates. Professor Charles Babcock, of Cornell University, Ithaca, U.S.A., was nominated as an Honorary Corresponding Member.

Statutory Examinations.

The President announced that at a statutory examination held on the 27th and 28th ult. five candidates presented themselves for examination as to their competency to fill the office of District Surveyor under the Metropolitan Building Act; of these, only one passed, viz., Mr. Watson Hall. One candidate also presented himself for examination as to his fitness to hold the appointment of Building Surveyor under local acts, but he did not pass.

The President's Address.

The President then delivered the opening address of the session, which was as follows:— Gentlemen and Colleagues.—When the ancient Emir declared "Oh that mine adversary had written a book," he quaintly, though perhaps unconsciously, betrayed the selfishness with which he would truthfully expose the weak points displayed in the recorded opinions of his enemy. In the belief that I have now

adversary within these walls, nor, I hope, beyond them, I am happily released from the dread of such hostile criticism, and confidently indulge the hope that the views I have recorded, and which it is now my privilege to submit on the opening of another session, may be received with friendly, and even lenient, criticism.

We live in an age of progress. Nations and individuals are alike engrossed in the keen contest. In politics, in art, in literature, in science, in social and political economy, this is equally true. It matters not greatly whether customs are good, or men are able and useful,—if not conformed to the spirit of the times, they are alike set aside or superseded in favour of modern progressivism. Real progress is the characteristic of a living age. To attain to whatever elevates the aspirations, ennobles the ambition, or promotes the civilisation of man is commendable. But to inaugurate constitutional changes from motives other than the welfare of the community, to yearn for novelty in art, to ponder to sentimentalism in literature, to preach doctrines which are opposed to the true principles of political economy, these are the outcome of a foolish craze for progress which is a remarkable characteristic of our day. Those who cling with affection to customs which, having been approved by the experience of past generations, they refuse to abandon till convinced that change is necessary,—not for the sake of change,—but for the well-being of society, are apt to find themselves regarded as venerable relics of antiquity, eminently respectable, it may be, but tolerated only because they are so, and destined at no distant date to be swept away in the ever-increasing flood of so-called progress. To attempt to define the extent to which the changes and reforms of modern times may have contributed to true progress would involve an inquiry foreign to my present purpose; it may, however, be asserted with tolerable safety that such changes have not always deserved the name, and that, in not a few instances, they have retarded, instead of forwarding, the advancement of civilisation. With no less assurance may the forecast be made that some at least of the changes with which society is now threatened will fail in attaining the results professedly desired by their advocates, and will end in disappointment, if not disaster. If, therefore, we attempt to review some aspects of our profession, or of interests cognate to it, with the view of defining our position in relation to the past, or of forecasting our probable position in the future, it is of the first importance to be satisfied as to what constitutes progress, and to be on our guard lest, as too frequently happens, we confound it with mere change, or the restless desire for disturbing existing institutions.

Draughtsmanship.

At the outset of such a review we are struck with a remarkable development of recent years,—the perfection which architectural draughtsmanship has attained. It is not possible to regard the drawings submitted yearly for the prizes offered by the Institute and the Royal Academy, or prepared in profusion for competitions, with anything short of admiration, combining as they do technical accuracy with artistic feeling,—the essential characteristics of good draughtsmanship. To set aside by side the drawings of some generations since and those of to-day, is to exhibit not so much comparison as contrast; for in many drawings of old masters in architecture, knowledge of perspective and firmness of touch are alike conspicuous by their absence. The perfection of modern draughtsmanship is, no doubt, to be traced, to some extent at all events, to the spirit of emulation inspired by competitions for students' prizes, and to the prevailing practice of inviting competitive designs for public buildings, both of which naturally enlist all the resources of the draughtsman's skill. That this advance in architectural draughtsmanship constitutes, so far as it goes, real progress, may be conceded; indeed, the younger members of the profession may be honestly congratulated on the artistic beauty and perfection of their handwork. If, therefore, I venture to point out to temptation to which their skill exposes them, I am actuated by no ungracious spirit of desiring to detract from the legitimate merit of their work. No one can doubt the importance of good draughtsmanship to an architect, for it enables him to express readily and freely the ideas which are to constitute his design. The pencil is to the architect what the pen is to the author: the mode of expressing his ideas; no more. Essential as this is, obviously the mode

of representation is of less consequence than the thing represented, and it is because I have observed a tendency to drown architecture in mere draughtsmanship that I am induced to remind you that, although every architect ought to draw, and draw with facility, it is yet possible to be a good architect without being a brilliant draughtsman; and, conversely, that it is possible to be an expert draughtsman, and yet not to have any claim to be an architect. Architecture is the material embodiment of conceptions of the mind; drawing is the medium by which these can be, at the best, but inadequately expressed. It may be excusable to smile at the draughtsmanship of old masters whose names live in history as great architects, but it may not be amiss for the brilliant draughtsmen of to-day, while justly proud of their attainments, to ponder on their prospects of acquiring equal fame; for while it is good to know how to draw with artistic excellence, it is better to know how to design with purity and truth; the one may be, like a beautiful face devoid of character, the graceful expression of vanity; the other, like features inspired by character, must be the embodiment of spirit and of life. In architectural competitions the importance of appointing professional assessors is often enforced on the ground that it is impossible for promoters to arrive at a just decision without the assistance of an expert; this is true; but my experience has taught me that there is another side to this question, and that not the least responsible part of an assessor's task is to protect promoters from being imposed on by the tricks of draughtsmen whose ability is more apparent than their morality. Such trickery may mislead the uninitiated; it is transparent to the expert; and at the hands of a just assessor it will not fail to meet with the reward it deserves. In a word, so long as draughtsmanship is the truthful delineation of effects which it is desired to produce, it cannot be too good; when, however, truth is disregarded, and when the temptation is yielded to of producing devices though attractive effects which the draughtsman knows could not exist, then no amount of technical or artistic cleverness can make it worthy of the art it professes to delineate, or bring it within the sphere of true progress.

Architects' Education.

Drawing being part of an architect's training, it is natural, in passing, to glance, however cursorily, at the more general question of education. Recent years have witnessed vast strides in this direction. The question is not now so much whether people will be educated, as whether they do not incur the risk of over-education. Food is necessary, but excess of food will not assimilate, and is injurious. The progressivism of School Boards involves this danger, and has a tendency to engender discontent by lifting some above the sphere for which they are suited by nature, and in which they would, unless thus surfeited, become useful members of the community. State Education should be elementary. When it embraces higher branches, the advantage, to say the least, is questionable. Modern progressivism, however, has not reached the stage of proposing that free education should be extended to students in architecture, and the risk of over-education, therefore, is one to which we are not as yet exposed; but, apart from such a utopian prospect, which, for all we know, may be in store for our posterity, the educational facilities which students now enjoy are remarkable when compared with those of a generation or two since. Such agencies in the shape of colleges, schools, institutes, academies, and classes are too numerous and too well-known to justify recapitulation. I must, however, notice, in passing, the latest developments exhibited in the remarkable curriculum of University College, King's College, and the Architectural Association. The new departure of the latter in inaugurating a more complete and systematic curriculum of professional education than it had previously attempted was regarded by not a few with some amount of apprehension. A personal, however, of the annual volume,—the "Brown Book,"—recently published, in which is given the results of the first year's working, must tend to dissipate such fears. The report, which I commend for your perusal, bears the impress of a simple statement of facts, without any apparent effort to make things look better than they really are. A glance at the balance-sheet,—the crucial test of success or failure,—shows that the fees paid by students amounted to the

large sum of 645*l.*, which more than sufficed to defray the fees paid to lecturers, amounting to 601*l.*, while the result of the whole year's working, including increased rent and charges, shows the comparatively small deficit of 128*l.* The donations paid to the general fund amounted to 991*l.*, and, after defraying the cost of alteration of premises, furniture, and the above deficit, there remained a balance at the credit of this fund amounting to 480*l.*, to which has to be added donations promised but not yet paid amounting to 359*l.* Without entering into further detail, which the time at my disposal forbids, it will be seen that the progress attained during and critical,—has been real, and such as to encourage the promoters in the continued and energetic prosecution of the scheme. It is obvious that an undertaking so wide in its organisation, and requiring so numerous a group of workers, could only be attempted in the Metropolis; but we may, without indulging in prospects too sanguine, anticipate the advent of a systematic educational organisation throughout the country. The scheme now under consideration of creating architectural provinces, each with its own centre, and embracing an area with defined boundaries, would certainly tend, by stimulating local organisations, to facilitate the attainment of such a result. Existing educational agencies might thus be fostered, and the advantages they offer be brought more prominently before students, and new agencies might be created where none now exist, so that students in each architectural province would not be without those educational facilities which are now enjoyed in the Metropolis. To time must be left the development of such a scheme, for it is apparent that, like all other attainments in real progress, they cannot be forced into existence, but must be slow and gradual in their growth, the outcome of a carefully thought-out organisation.

To what extent architectural education is likely to be affected by the proposed establishment of a Gresham or Teaching University for London cannot be predicted. A Royal Commission is now engaged in taking evidence, and considering the whole question. That such a university must embrace Art, as well as Science and Literature, may be taken for granted, and it would seem reasonable that a definite place should be claimed for Architecture. The scope of the University is thus defined by Professor Huxley in a letter from him which appeared in *The Times* on July 7 last:—

"The University occupies a position altogether independent of general or of technical education. It is neither an institution for testing the work of schoolmasters, nor a machinery for acceding the fitness of young men to be curates, lawyers, or doctors. It is an institution to which a man who desires to devote himself to any branch of science or art may go in full confidence that he will find there those who can teach him (or put him in the way of learning) what is already known in regard to that discipline, and still more train him in the methods by which he may himself advance that kind of knowledge. Under art are to be comprehended literature, the pictorial and plastic arts, architecture, and music; under science, logic, philology, mathematics, the physical sciences, and archæology and history. The question of the connexion of the university (in this sense) with the high schools and the technical schools of theology, law, medicine, and so forth, comprehended under the present facilities, and the working in of the present chaotic raw material of educational institutions in London into an organised whole, are matters of detail which will settle themselves as soon as people are agreed upon first principles."

The Examinations.

Teaching naturally suggests Examination. Having devoted a considerable portion of my address last year* to this subject, it would be unpardonable were I now to detain you at any length by recurring to it in detail. I must, however, be permitted to remark that, so far as I know, no advocate of Examination ever thought or expected that it would or could create a great artist or a great architect. It is not fair criticism to condemn an educational test because it does not effect a result which was never intended, and which is impossible. As consistently might University tests be objected to because they do not in all cases produce great divines. No one thinks, however, of disputing that they act as stimulants to the acquirement of knowledge upon which success in life so largely depends. I feel justified in asserting that the Associates' Examination has hitherto successfully withstood the somewhat fierce,—and I feel bound to add the not always just or fair,—criticism to which it has been exposed, for as the practical issue of all that

* See *Builder* for Nov. 7, 1891, p. 344.

has been said and written, the rising generation of architectural students have come forward in increasing numbers, and the cry is, "Still they come!" Does not this imply that they appreciate the active labours of the Institute in endeavouring to raise the standard of knowledge and promote the efficiency of architects, rather than mere academical and inoperative disquisitions? That the Examination may exhibit defects of organisation, or that it may be capable of improvement in certain particulars, is very possible; but that, after all, is no more than may naturally be looked for in a comparatively new institution, subject to such changes as experience may from time to time dictate. Those who may desire to offer suggestions with the view of rendering it more efficient may be assured that any reasonable proposals will always receive careful and impartial consideration from the Board of Examiners, whose generous and unremunerated labours we all appreciate so highly. I desire to record the conviction that the Examination continues to prove,—what I never doubted it would prove,—an encouragement to study and a stimulus to the increase of knowledge, and because it has proved this, it has been, in my opinion, a step in the direction of real progress. I embrace this opportunity to intimate to the architects of the United Kingdom that we invite their co-operation in the endeavour to obtain, for all those about to enter the architectural profession, a systematic course of education tested by examination, and to remind them that the Examination will be conducted in its present form until the end of 1893 only, and that thereafter the progressive Examinations, of which detailed particulars are published in "The Kalendar," will be in full operation.

Qualification of Fellows.

In view of the keen interest that is evinced in the proposed examination or qualification for Fellows, you will, no doubt, expect me to refer to it, and, indeed, I should not be disposed to pass without notice a subject which touches so nearly the interests of the profession and of the Institute. Last year I did not hesitate to express the conviction that, in pursuance of the permissive powers of the Charter, the Institute should declare that, on and after a date to be specified, "every person desiring to be admitted a Fellow shall be required to have passed such examination or examinations as may be directed by the Royal Institute," subject to the proviso that "in special cases the Council shall have power to dispense with such examination or examinations." If I have not since then pressed the consideration of this subject on your attention, it is not because I have seen any reason to alter or modify the view I thus expressed, but because, having, as it were, lunched it, I deemed it only right that full time should be allowed for the mature consideration of a project fraught with such important interests. For the same reason, when a definite proposal was submitted to you by Mr. Barry, at the close of last session, the decision you then arrived at to refer the whole subject to the Council, that they might consider it in all its bearings, had my full sympathy and concurrence; for it is scarcely possible that a subject of this nature can be treated in a controversial discussion at a sessional meeting with the same grave deliberation that it is likely to receive in the calmer atmosphere of the Council-room. The subject being still *sub judice* so far as the Council are concerned, I am precluded from treating it in such detail as I otherwise might do, but I apprehend that there is no impropriety in pursuing the course I adopted last year, and placing before you my own opinion, for what it is worth, without in any way pledging the concurrence of the Council in my views. I conclude that all are now convinced, whatever may be their individual opinions as to how the change should be effected, that some change must be made in the qualification for Fellows. It would be inconsistent and intolerable were the present position to continue, for it means that up to thirty years of age men can only be admitted to membership by passing an examination, and that after reaching that age they can be elected Fellows without any such test. This was never intended to be a permanent arrangement, and has only to be stated to secure condemnation. Mr. Barry's proposal is that candidates for the Fellowship should, with certain exceptions, only be elected from the class of Associates. This would practically be equivalent to applying the same test to the primary

and secondary classes of members, and does not seem to me, therefore, sufficiently to meet the case. Then, again, there are those who consider that the qualification for the Fellowship should be a separate examination on a higher grade than that for the Associateship. To this the reasonable objection may, I think, be raised that men would thus be called on to undergo an exhaustive and trying ordeal at a time when they are likely to be engrossed with practice, and would not, therefore, have leisure to prepare for it. The resulting issue might, and probably would, be that architects who had already passed the Associates' examination, and who might be demonstrating their ability in their executed works, might be subjected to the indignity of failure simply because they could not give the necessary time for preparation without sacrificing their position or their prospects. It would seem to me unreasonable to expect men, who have already proved their knowledge of the theory and science of architecture by having passed the Associates' examination, to undergo another and a more difficult ordeal of a similar nature, their capacity for which they may have sufficiently exhibited in their works. On the other hand, it seems to me reasonable that the single test of theoretic and scientific knowledge is sufficient, and that, having once satisfied that, the further test or qualification for the Fellowship should be, in addition to what now exists, an examination of the actual work of the candidate. In short, let an Associate be tested as a student; let a Fellow be tested as an architect. To carry this out, it would only be necessary to enact, in accordance with the permissive powers of the Charter, that on and after a date to be specified, every person desiring to be admitted a Fellow shall, in addition to the present qualification, be required to have passed the Associates' examination, and to undergo the further test of submitting to the Council evidence of his executed works, always providing for special or exceptional cases by the dispensing power which the Charter confers on the Council. Such an enactment would remove the existing anomaly that a candidate twenty-nine years of age can only acquire membership by examination, while a candidate thirty years of age can acquire it without any such test; and it would further meet the views of those who, to use the characteristic, if somewhat emphatic, words of Mr. Ernest George, think that "the Institute should relinquish the custom of admitting any respectable father of a family, however damnable his productions." It is not apparent what is the necessary connexion between being the father of a family and producing architectural works deserving of such condemnation, but this Mr. Ernest George will, no doubt, be able to elucidate during the deliberations of the Council. Apart, however, from the somewhat quaint and scarcely reasonable paternal restriction referred to, I understand Mr. Ernest George to mean that the proper test for admission to the Fellowship is the work of the candidate, and in this, as you will have seen, I concur. What better or more fitting test can there be? for it is true,—happily or unhappily, as the case may be,—that by his works he is already known and judged by the public. For some time past it has been the custom of the Council to request applicants for the Fellowship to submit drawings or photographs of their executed works, a custom to which I have consistently objected, on the ground that it was tantamount to the institution of a test or examination for Fellows which was not sanctioned by the Charter, and was therefore illegal. But the case is now different. We propose to institute such a qualification in accordance with the powers which the Charter conveys, and it consequently becomes not only legal, but to my mind would be equitable, to require an applicant for the higher class of membership to be tested here—as he is judged by the public—by his works. It may be objected that this would be subjecting an architect to examination on what, after all, is a mere matter of taste. I think not. Architecture, if this test is applied, it must be a test of architecture. The evidence submitted must be such design as will illustrate the candidate's power of design as well as his scientific attainments, and will enable the Council to judge of his title draughtsman; not merely a designer; not merely a constructor; not, but the combination and embodiment of all these—in one word, an architect. The Council of the Institute is a

body composed of individuals each one of whom, probably, has his own idiosyncrasies or preferences, and his own conception of what constitutes good architecture; but the collective body will, I apprehend, ever be what should be, the representative, not of a school or party, but of the profession of architecture, and I can conceive of no adjudicatory body likely to prove so fair and so competent. I indulge the hope that the Council may see the way to present to you in one course a unanimous recommendation on this subject, and to arrive at a unanimous decision as to the solution of the problem. Division is to be deprecated. Opinions of course differ,—nor could we expect it to be otherwise. If each one solves to adhere uncompromisingly to his own opinion, unanimity cannot be attained. I venture to urge on all to approach the discussion of this matter in the spirit of friendly compromise, willing to be convinced,—to good arguments give place to better,—and anxious only that the ultimate decision may be such as may most conduce to the true and permanent interests of architecture, and to the attainment of real progress.

The Institute's Publications.

I desire now to refer to a subject, affecting the internal policy of the Institute, which seems to me of considerable importance. At present the Institute issues three publications annually—"The Kalendar," "The Journal of Proceedings," and "The Transactions." "The Kalendar" is a book of reference affording full information on all matters connected with the Institute invaluable to many and useful to all. "The Journal of Proceedings" comprises a digest of the papers delivered at the sessional meetings, a full report of the discussions which they give rise, a leading article, and other contributions of literary excellence on subjects of interest to the profession. "The volume of 'Transactions'" is a carefully-edited and profusely-illustrated reproduction of the papers delivered during the Session. Under this system the papers read at the sessional meetings are,—with the exception of Presidential Addresses,—printed, first in the form of an abstract in "The Journal of Proceedings," followed by a full report of the discussions, and afterwards they are printed in full along with illustrations in "The Transactions," followed by an abstract of the discussions. Presidential Addresses, on the other hand, are printed first in full in "The Journal of Proceedings," and afterwards in "The Transactions" in a form in which they were neither conceived nor delivered. Discussions, again, are printed, first in full in "The Journal of Proceedings," along with the abstract of the papers they refer to; and afterwards in "The Transactions" in the form of an abstract, following the full report of the papers. Thus all papers and all discussions are printed twice, once in an abridged form which is practically valueless for reference, and the full reports of the papers, and of the discussions emanating from them, are respectively printed in separate volumes and at different dates. It is difficult to conceive of a system more confusing, inconvenient, costly, and ridiculous, the inception of which it is not easy to account for, the continuance of which it is impossible to justify. I seem, indeed, to combine every disadvantage which a disordered ingenuity could invent, and to deprive members of every advantage that they have a right to look for. What benefit can there be in printing all our papers and discussions twice; in publishing papers and discussions in separate volumes and at different periods; and in issuing the discussions in full at the time they occur, and the papers which gave rise to them months afterwards when both have become ancient history? The true value of a discussion can only be appreciated by those who have either heard or read the paper which inaugurated it, but members,—with the exception of the comparatively few who are present at the sessional meetings,—receive a full report of the discussion without knowing much of the subject as opened, and for the full report of the latter they must wait until after the close of the Session, when the subject, if not forgotten, has probably ceased to be of interest. Thus the printed reports both of our papers and discussions lose much of the value they ought to possess, both for ourselves and for the public.

This brings me to the proposal which I desire

to submit for your consideration, namely, that the separate publications now issued,—“The Journal of Proceedings” and “The Transactions,”—should in future be merged in one publication, to be called “The Journal of the Royal Institute of British Architects”; that such publication should be issued within three or four days of the dates of the sessional meetings; and that it should comprise a full report of all papers and addresses in the form in which they are delivered, with illustrations, and a full report of the discussions, along with such other contributions, articles, critiques, or reviews, as may be deemed of professional interest. In justification of the present system it will no doubt be urged that it would be impossible to publish the sessional papers shortly after delivery, and still more impossible to reproduce the illustrations, without involving the risk of errors, inaccuracies, and defects which are inherent to hasty production, and that, consequently, our “Transactions” would, under such a procedure as I suggest, be deprived of many of the admirable qualities which Mr. White’s labours have imparted to them, and would lose much of their value as a permanent record of the literary work of the Institute. This, I admit, would be a result which we should all deplore; but even were it inevitable, which I do not believe, the question might fairly be asked, whether the papers in a comparatively imperfect form published shortly after delivery would not be of more value to members than the now are, issued months later? I am satisfied, however, that the argument to which I have referred is not conclusive, and that there is really no valid reason why the papers, with their illustrations, and the discussions emanating from them, should not be published together, and immediately after delivery. In order to evolve this satisfactory result it is only necessary that a committee, say the Literature Standing Committee, should become responsible for providing papers to be read at our meetings, and that they should so organise their work as to have papers in hand, say, three months before they are required to be delivered, instead of receiving them from their authors, as is now too frequently the case, at the last moment. If it be urged that this would be impracticable, and that it would be hopeless to expect authors to produce their papers so long before they are required, I reply that what is feasible in the case of other publications should be equally so with ours, and I decline to believe that any difficulties would exist which could not readily be overcome by system and organisation. Ample time would thus be secured for revision by the editor, for printing, and for producing the illustrations beforehand, with the same care and consideration as are now bestowed upon them, so as to be ready for publication within a few days of the date of the meetings.

The advantages attending this proposal are obvious. The papers and the discussions upon them would be printed once only, and would be published together in a complete and permanent form within a few days of delivery. Members would thus have the whole proceedings to peruse and refer to, instead of part only. The convenience of future reference would be facilitated by the papers and discussions being published in the same volume. The single publication would possess an importance, and acquire an influence, which, under the existing system, is unattainable. Lastly, the cost of printing and publishing would be materially reduced, and the income of the Institute would be correspondingly enhanced. I think I do not entertain too sanguine a view when I anticipate a saving of about 500*l.* a year. Thus the consideration of attaining a wider margin between income and expenditure, which I strongly urged in my address last year, would at once be realised. Important as I consider this consummation, I would certainly not urge the adoption of the change by means of which I propose to effect it, were it to militate against the interests of the Institute; but when, as I believe, the much-desired financial result would be attained by a measure which in other respects would be beneficial, and would tend to promote the usefulness of the Institute, directly to its members, and indirectly to the public, I feel no hesitation in most strongly urging you to accept the suggestion which I venture to submit for your consideration. The present system is not conducive to the convenience of members; it militates against the welfare of the Institute; and I am satisfied, therefore, that the change which I advocate would be an important step in the direction of real progress.

The Duke of Devonshire's Drawings.

The list of our Honorary Fellows has been enriched by the addition of the name of the Duke of Devonshire, whose courtesy in responding to our request, and lending to the Institute the unique and valuable collection of the original drawings of Palladio, Inigo Jones, and others, a selection from which was exhibited on the walls of this room on the Gold Medal night, we all thoroughly appreciated.* Thanks to the trouble ungrudgingly taken by Mr. J. D. Crace and Mr. Wyatt Papworth, the drawings have been arranged in proper order, and they have now been returned to the Duke with the renewed expression of our acknowledgments.

Resignation of the Hon. Secretary.

It is with much regret that the Council have accepted the resignation of Mr. Aston Webb as Honorary Secretary, an office the duties of which he has discharged for more than three years with credit to himself and to the benefit of the Institute. Increasing professional engagements having rendered it difficult for him to attend to the work of the Institute, he decided to resign before the last election of the Council, and only consented at our earnest solicitation to remain for a short time longer, on the understanding that he should be allowed to retire before the commencement of the active work of another Session. The regret felt by the Council in parting with so genial and efficient an Honorary Secretary will be fully shared by every member of the Institute, and I trust I may be permitted to express the sense of personal loss which I sustain by his resignation. Had the By-laws permitted it, the Council would have proposed the immediate nomination of Mr. Webb as a Member of Council. This, however, though not possible now, may, I hope, be regarded as only deferred till the next election, when I doubt not his nomination will receive unanimous support; and thus his official connexion with the Institute, whose welfare and usefulness he so much desires to promote, would be continued. The only compensation for a loss so real is the prospect that the office may be filled by a worthy successor; and it is with great satisfaction I am able to intimate that the Council have been so fortunate as to obtain from Mr. William Emerson the assurance that he will be willing to serve, if elected. They have, accordingly, unanimously nominated him for the vacant office. Mr. Emerson is not unfamiliar with the work, having served for some years as a Member of Council; he is interested in the welfare of the Institute; and he is an architect of position and of ability. I cannot doubt, therefore, that the nomination of the Council will receive the unanimous approval of the Institute.

Capital and Labour.

The great question of Capital and Labour, which engages so much attention in the present day, consequent on the oft-recurring and disastrous strikes of recent years, is one which we architects cannot disregard. Capital and labour are alike essential to the execution of our designs. Without them we could produce pictorial representations, but not buildings. Hence, the disturbance of amicable relations between them vitally affects our interests. Labour may be congratulated on the manifest desire now exhibited by society to accord to it fair, and even liberal, remuneration. That this may to some extent be attributed to the stand which workmen have by combination and organisation made in defence of their interests, may be fairly conceded. To combination for such legitimate objects, no reasonable person can, or does, object; but when trade organisations are used for the purpose of imposing arbitrary restrictions on labour, of depriving the workman of his right as a free citizen to work how and as he pleases, or of arbitrarily reducing the hours of work without a corresponding diminution in wages, such as may be dictated by the law of supply and demand, then it seems to me that the real friend of the working man is not his leader who preaches such pernicious doctrines, opposed alike to political economy and common sense, but rather he who bravely warns him of blind leaders of the blind, who, be their motive what it may, are luring him to inevitable and certain disaster. When last year I was—as your representative—invited to settle by arbitration the differences that then existed between the master builders and the carpenters of London, I did not hesitate when making the award to record

my conviction that the result of such action had been to inflict permanent injury on workmen by driving their trade into foreign channels from which it was not likely to return. That this has occurred there is abundant evidence. A significant admission of it was, indeed, afforded at the Trade Union Congress held in Glasgow in September, when resolutions were proposed with the view of moving Parliament to prohibit the importation of foreign work and foreign labour. It is true that the proposal proved too much even for the Trade Union Congress, who betrayed no nervous hesitation in adopting any number of resolutions of an advanced socialistic tendency; but it is none the less a sign of the times that such resolutions as I refer to should even have been proposed. That the sound and unwise policy pursued by the Trade Unionism of to-day, if persisted in, will result in permanently injuring the trade of the country, I firmly believe. The agitation for the statutory restriction of labour to eight hours, or any number of hours arbitrarily fixed, conflicts with the principle of freedom which we have always, and rightly, regarded with pride; it is repulsive to our inborn feelings, and would make slaves of freemen. Man is endowed with energies, with mental and physical powers, not that they may stagnate by limitation, but that they may be used to the utmost in promoting the welfare and comfort of these dependent on him, and the consequent prosperity of the community. No Trade Union, Parliament, or Power, has a right to restrain the energy or restrict the will of any individual. Would that the working men of England would appreciate the danger they incur by limiting their native powers of production, and would see how much better it is to have work on reasonable terms than to drive it away, and then try by arbitrary and delusive restrictions to spread what is left over the wide area of the unemployed which has been created to a great extent by their own short-sighted folly. Would that we could apply to them the words of Matthew Arnold:—

“In their own tasks all their powers pouring,
These attain the mighty life you see.”

A “mighty life,” because free from pernicious limitations, and characterised by the ceaseless concentration of power and energy which constitute the only real highroad to success. A “mighty life,” because inspired by teaching which is Divine, to work,—and work with might,—while it is called to-day. When workmen burst the fetters with which Trade Unionism is surely binding them; when they return to the good old days of freedom of contract and earnest work; when they recognise, what is as old as the hills, that “in all labour there is profit; but the talk of the lips,”—of which we hear so much in these later days,—“tendeth only to penury”; then,—but not till then,—may they expect to emerge from the dismal shade of progressive socialism, and walk in the path of real progress.

The Chicago Exhibition.

The World's Fair, which is to be opened at Chicago on the 1st of next May, promises, in point of magnitude and completeness, to eclipse all previous Exhibitions, remarkable as many of these have been. The site allotted for the purpose of the Exposition comprises the enormous area of 1,037 acres, of which, however, it is probable that only 600 acres will be utilised. The Paris Exposition Universelle of 1889 occupied a site of 173 acres,—about one-fourth the size of that of the World's Fair of 1893. The designs of the principal buildings of the Exhibition are the work of different architects, and are said to be “prepared under such conditions as to secure a harmonious effect.” The character of the buildings is Classical, and the adoption of one style throughout has, no doubt, facilitated what might appear the somewhat difficult process of harmonising individuality. Separate buildings are devoted to the fine arts; manufactures and liberal arts; agriculture; machinery; electricity; mines; transportation; and horticulture. The interests of Great Britain have been confided to the care of a Royal Commission, consisting of the Earl of the Society of Arts, with H.R.H. the Prince of Wales as President. The labours of organisation are distributed among fourteen committees, irrespective of twenty-three local committees throughout the kingdom. The Fine Arts Committee have issued invitations to a large number of painters, sculptors, and architects to contribute works for exhibition, and these, as well as other works of art which

* See *Builder* for July 2 last, p. 8.

may be selected by the Committee, will be insured, transported to Chicago, and brought back, at the expense of the Royal Commission. Drawings should be delivered at the offices of the Royal Commission, John-street, Adelphi, prior to a date of which due notice will be given, probably before the end of the year. The Fine Arts Committee hopes that the exhibition of architectural drawings will be such as may be thoroughly representative of the architecture of our day, and worthy of the profession.

Emanuel Hospital.

The retention and preservation of buildings, the antiquity or the design of which imparts to them distinctive interest, must ever command the sympathy and active support of architects. Emanuel Hospital, Westminster, is such a building. It has been much before the public of late, but it had long before engaged the attention of the Standing Committee for Art, and of the Council of this Institute. So long since as March, 1890, when the possible destruction of the building was first contemplated, the Council sought, by influencing the Governors, to secure its preservation, and received from an influential member of that body the assurance that every consideration should be given to the question of saving so interesting a relic of the past. When at a later date it became apparent that the building was in danger of being destroyed, I personally endeavoured, by invoking Parliamentary aid, to avert such a calamity, only, however, to find that such arguments as I could use, based as they were on the importance of preserving a building of architectural interest, and of retaining an open space in a densely-populated locality, were not deemed sufficient to outweigh those that were urged in favour of removal. The decision of Mr. Justice Chitty following soon after, and arrived at after patient consideration of the circumstances, demonstrated to my judgment the futility of further action. The protest which subsequently appeared in the *Times*, signed by gentlemen whose names carry weight in the political and artistic world, although commanding my sympathy, seemed to me to come too late to be of any practical value. I much fear, therefore, —and I say it with great reluctance,—that we must look on the preservation of this interesting, —if not unique,—example of the architecture of the days of Queen Anne as hopeless, a conclusion which cannot fail to be keenly disappointing to all lovers of art, and peculiarly so to architects.

Church of St. Mary Woolnoth.

Another interesting building which has this year been threatened with destruction, and which the Council have sought to preserve is the Church of St. Mary Woolnoth, the work as you all know, of Nicholas Hawksmoor, the pupil and friend of Sir Christopher Wren, and a familiar landmark in the City of London. A Bill was promoted in Parliament by the City and South London Railway Company, in which powers were sought to construct an underground railway through the City, and in the exercise of that artistic instinct which is such an eminently distinguishing characteristic of commercial bodies, the Company, with an amount of consideration which must command our gratitude, selected the only edifice in the immediate neighbourhood possessing architectural interest as the site for their station. The Council again took prompt action. I personally interviewed the authorities, and we thereafter petitioned Parliament, on public as well as on architectural grounds, not to sanction the proposal, so far as St. Mary Woolnoth was concerned. The Bill did not reach the Committee stage, but in the event of its being re-introduced our opposition will be renewed. The progressive and destructive spirit illustrated in these cases may commend itself to the severe utilitarianism of the day, but you will, I am sure, concur with me in thinking that the interests of real progress have been promoted by the judicious conservatism which has prompted our action.

The Wellington Monument.

With no small satisfaction may we note that the great work of Alfred Stevens, —the Wellington Monument,—is at length being rescued from the obliquity imposed by the inappropriate position it has occupied for many years, and is now being erected on the site in St. Paul's Cathedral for which it was designed. It will thus be possible for future generations to regard it, alike as a noble monument to the memory of the great soldier it commemorates,

and of the great artist by whom it was conceived. For this we have to thank the public spirit and example of the cultured President of the Royal Academy, Sir Frederic Leighton.

New Streets in London.

The projected new thoroughfare from the Strand to Holborn, for the formation of which the London County Council are about to seek Parliamentary powers, appears to have created a good deal of criticism. The scheme has been so long under consideration, and has evidently been so exhaustively dealt with by the Improvement Committee, that the presumption is in favour of the route they propose being the best to meet all the necessities and difficulties of the complex problem. There are those, however, who consider that the suggested street is not required; some who think that as proposed it would not be in the right place; while others, again, prefer a route the continuation of which across the Thames by means of a new bridge would relieve the traffic of Waterloo Bridge. I do not pretend to have sufficiently studied the subject to be a competent judge, but I should have thought that anyone who is in the habit of traversing central London must have been convinced of the necessity of some such main artery as the County Council propose, while I should not advocate the multiplication of bridges across the Thames, except on the ground of proved necessity. The idea of diverting the traffic from the north to the east and west at the southern extremity of the proposed street, instead of discharging it at a single point in the busy thoroughfare of the Strand, is a happy thought which ought to conduce to the convenience of the public. The expediency, however, of laying out the street on the central axis of a line drawn northwards from the centre of the Church of St. Mary-le-Strand appears to me open to doubt. The Church of St. Mary was designed, as we know, to be viewed from the west and east, notably the former, where it forms so charming a feature in the street architecture of London; and from an artistic point of view it is questionable whether it is wise to make it the central feature of a northern thoroughfare, to which it would present a frontage not designed for such a purpose, with the tower and steeple to one side instead of being in the centre of the vista from the north. I am disposed to think that it would be better not thus to accentuate the northern view of the church; and that a happier disposition would possibly be taking a line for the new street a little more to the west than is proposed. There may, however, be difficulties, or objections, of a practical nature to the adoption of such a treatment, and I can only, therefore, submit the suggestion, with diffidence, for what it is worth. The displacement of population involved in this scheme would necessarily be considerable, and I observe that, with the exception of 470 persons whose work and occupations necessitate their being rehoused on the spot, and of 800 persons whom it is necessary to rehouse within one mile of their present residences, the Committee of the London County Council contemplates the removal of the greater proportion of the working-class population, amounting to about 1,800 persons, to the suburbs. This commends itself to my judgment as wise. While fully appreciating the admirable work done by the several companies who have erected improved artisans' dwellings in different parts of London, I yet think that the solution of the overcrowding of the metropolis is to be found in the encouragement of the working classes to reside in the suburbs, and in providing facilities, by means of railways and tramways, to enable them to do so.

Should the scheme of the London County Council to which I have referred be carried out, so noble a thoroughfare will afford a worthy field for the display of architectural skill. I observe that in their report the Committee state that the plan which they recommend would enable "the Council to control the architectural elevation of the new street." Should this mean that the control is to be real, —and not visionary, as in the case of Northumberland-avenue,—and that it is to be exercised by persons competent to deal with the subject, we may regard the proposal with satisfaction; for, under such conditions, architects need not dread irksome interference with their designs, but those who claim to be so, without,—so far as we may judge from their works,—justification, would be properly subjected to control from which the public could not fail to

derive benefit. It is to be hoped that architect who may be consulted may be inspired by a lesser motive than the endeavour to enhance public taste by adorning a public thoroughfare. Our teaching is not that of a book or a parchment, which may be read or cast aside, or that of a picture, which may be studied or regarded at pleasure, but it is engraven in material form which must be seen and read by all men, whether they will or not. Would the architects who undertake to design buildings for important sites and leading thoroughfares always realised that they incur responsibility not to their clients only, but to the public also for such buildings cannot by any possibility remain unoperative; they must exercise so influence for good or for evil on the minds of men, and in proportion as they are inspired, truth and purity, and create corresponding elevating emotions, are they entitled to rank as works of architecture. Apply this test to the London. Speaking generally,—for there are, of course, exceptions here as elsewhere,—who say that the structures in Shaftesbury-avenue, or that the structures in a cultured man other than those of irritation and disgust. Buildings they are, certainly,—architects they are certainly are not. Take another illustration. Who can imagine that the authors of the edifices which have recently been erected on that magnificent thoroughfare, the Thames Embankment, between Waterloo and Charing Cross bridges, or at Albert Gate, realised the responsibility I speak of? One would but thought inspiration would have been derived from the mere fact of designing buildings on such imposing sites, to say nothing, in the case of the Embankment, of the proximity of Somerset House, to the stately proportions of the simple forms of which the eye turns with relief and refreshment.

The Education of the Public Taste.

We bear much said, and we see much written of the necessity of educating public taste. Would that the necessity were more generally appreciated! for, with a really educated public taste, it would not be possible to point to so many illustrations demonstrating, alas! the lamentable absence of taste and refinement on the part of many so-called architects. Be while this is too true; while I witness with dismay splendid opportunities absolutely sacrificed, which might have been and ought to have been mediums for elevating and refining public taste; yet when I recall with a chill shiver the depressing dreariness of an age of stucco and monotony now happily a thing of the past when I behold the bright and hopeful advent of an age distinguished by the use of genuine materials; when I appreciate the artistic spirit which unquestionably breathes in much of our domestic work; and when I recognise the undoubted desire of all,—whatever their shibboleth,—to promote the knowledge of our art, whether by study, practice, examination, or aestheticism; I gladly record my conviction that the architecture of to-day,—although falling far short of what we long to see, although exhibiting an exaggerated enthusiasm for the element of quaint picturesqueness which I hope at no distant date to see leavened by the spirit of Classic purity and simplicity,—is yet not altogether unworthy of the enlightenment of these latter days, nor altogether out of harmony with this age of progress.

Mr. Eustace Balfour said the agreeable duty had been confided to him of proposing a vote of thanks to the President for his able and suggestive address. He (the speaker) would only venture to refer to one or two points of the address. The President had alluded to draughtsmanship in extremely well-chosen terms; and it was to be feared that too many men regarded draughtsmanship as the end, and not as the means. He had known a great many men, throughout the first-rate draughtsmen, who had deceived themselves by their mere ability in draughtsmanship. If the buildings which they designed could have been built as they were drawn they would have been beautiful; but unfortunately they were drawn as they could not be built. It had been said of an eminent architect that if he could have built his own cross-hatching his buildings would have been splendid. Another question to which the President had alluded was that of architectural competitions. It was his (the speaker's) misfortune to have to be very often a sort of informal assessor in architectural competitions, and it had occurred

to him that the present system of competitions was absolutely fatal to getting the best results. No private individual would be cool enough to deliberately pledge himself to the acceptance of a design for a building when he had previously debarred himself from having any communication with the designer as to his precise requirements. With regard to the collection of drawings belonging to the Duke of Devonshire, he would like to remind the meeting that there was an enormous collection of such drawings at Chatsworth, which would be found well worth examination and classification. He also thought it most likely that other interesting collections of architectural drawings might be found in other houses in England. With regard to the President's allusion to labour problems, he did not think it was thoroughly realised by the public in general that the cost of strikes and labour disputes came out of the pockets of the public, and not out of the pockets of the builders and architects. They all knew that builders were in the habit of putting on a large margin for safety when they thought strikes were inevitable. A still more serious matter was the disorganisation which ensued on works when strikes were pending, the foreman having no authority over men who were likely to go on strike at any moment. He himself had been told by a foreman, when he had complained of the had quality of the bricklayers' work, that he dared not tell bricklayers to carry out the architect's instructions, because the whole lot would go at once. That was a very serious state of things, and he thought that the President had done well in directing attention to the question.

Mr. Paul Waterhouse said it was with very great pleasure that he seconded the vote of thanks. He thought it was fitting, upon an occasion of that kind, that a voice should speak from the body of Associates, who were numerically stronger than the Fellows, and whose thanks to the President were not the less cordial than those of the Fellows. He thought the President was to be congratulated upon the felicity with which he had touched upon so many subjects relating to the welfare of the Institute and its members. In thanking the President for his address, they must not forget to thank him for his services as President during the past year, and for the bright promise that he gave them of his help in the forthcoming year. It was unnecessary for him (the speaker) to emphasise any of the points dealt with in the address; to criticise them would be impertinent, and to object to them would be impossible. The President had spoken of architectural education, and as a member of the Architectural Association he (the speaker) begged to express the thanks of that body for the way in which he had alluded to their first year's experiment. His deliberately spoken words of encouragement and commendation would be of great service to the Association at the present time. With regard to the subject of the publications of the Institute, many of them felt with the deepest satisfaction that the President had dealt a death-blow to an anomaly. It seemed eminently desirable that such an improvement as he had suggested should be inaugurated without any delay. As to the question of qualification for the Fellowship, he believed that they were on the eve of a change which, carried out on the lines which the President had suggested, would come as naturally upon the former growth of the Institute as a flower from the bud.

Mr. H. H. Langston supported the vote of thanks to the President. He said he had noticed that amongst the other qualifications described by the President as necessary for an architect, he had omitted to say that he should be a man of business. As to the President's criticism of the buildings in Shaftesbury-avenue and on the Embankment, he (the speaker) thought that, whatever their shortcomings, they were preferable to the monotony of Gower-street. He also thought that the President should have laid stress upon the importance of the planning of buildings, as well as on the design of their facades. He had been a little disappointed that the President had made no allusion to the Public Health Act of 1891, in the administration of which architects ought to take their rightful part, instead of leaving it in the hands of auctioneers and estate agents.

The vote of thanks having been carried by acclamation,

The President briefly replied. After thank-

ing the members, he said, in reference to a remark made by Mr. Langston, that he regarded the plan as the most important part of a building, and a part which could not be separated from the design. Before closing the business of the meeting, he wished to refer to the question of the election of a new Honorary Secretary. As had already been announced, Mr. William Emerson had been nominated to the vacant office. The Council assumed that there would be no other nominations, and in that case they proposed to proceed to the election at a Special General Meeting, after the Members' Ordinary Meeting on the 21st inst. The meeting then terminated.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

We continue our *résumé** of the evidence relating to the proposed reservoirs, reminding our readers that this evidence of immediate interest as bearing upon specific engineering proposals has been separated from a larger volume of evidence dealing with geological facts, opinions and theories with reference to the water in the chalk, and the extent to which it may be utilised. Besides the reservoir schemes developed in detail, one proposed by Mr. Baldwin Latham has been mentioned with approval by Mr. Wm. Topley, the geologist; but as it is one to appropriate the flood waters of the Upper Ouse, just outside the Thames Valley, it is understood to be regarded by the Commission as not within the scope of the reference to them, and therefore they abstain from examining it upon its merits. In the same manner other suggestions for going outside the present area escape scrutiny, although some of the supplies indicated are practically nearer London than the remote sources of the Thames and its tributaries. It may be convenient to mention that the later witnesses have included Mr. Wm. Topley, Professor Boyd Dawkins, Professor A. H. Green, Mr. Wm. Whitaker, Mr. Eugene de Rance, and Sir John Evans. In the evidence of these gentlemen is embodied all that geology can at present tell us with reference to the water-bearing strata of the basins of the Thames and the Lea, and some adjacent areas. It seems to be agreed that no additional supply can be obtained from the chalk immediately under London; that large quantities of chalk water are escaping into the lower Thames and into the sea, and may be intercepted, as they are at Brighton and elsewhere; and that some additional water may be pumped in the Kent Company's district. There is, however, more conflict of opinion as to pumping in the Lea Valley. On the one hand, it is said that climatic and other changes account for the lowering of the Hertfordshire streams, which lowering was complained of before the pumping began. On the other hand, it is said that the views of the geologists as to the storage of water in the chalk, its slow movement, and the percolation which must follow pumping, go to show that greater abstractions must ultimately diminish the surface streams. In this connexion a curious question has been raised. Seeing that the water "is so securely locked up in the mass of the chalk," as Professor Dawkins says, that it is forced out at the bottom by pressure at the top, and that the yield is finally ruled by the percolation, it was asked whether the water in the chalk can be regarded as a reservoir and an available supply. Professor Dawkins holds that it is practically available on account of the rapid flow through fissures that will be promoted by pumping; and Mr. Whitaker will undertake to supply London for many years from wells, but believes that by so doing he would dry up the surface streams. Mr. Whitaker, as a geologist, reminded the Commission that it is probable coal may be worked some day in the South of England. If it is, manufacturing industries will spring up, and there will be a great increase of population that will need a supply of water.

Professor Green's Report and Evidence.

Professor A. H. Green, F.R.S., Professor of Geology in the University of Oxford, in the course of a long statement, made the follow-

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 415, 438, 456, 459, 503; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 208, 16, 233, 353.

ing remarks on the Nine Reservoirs scheme of Messrs. Marten & Rife.

No. 1.—River Windrush.—The sources of this river lie among the limestones of the Cotswold Hills, but it soon enters a valley whose bottom is formed of Lias clay. As is invariably the case, under these circumstances, we have a broad, flat-bottomed valley, with gentle slopes, affording no sites for reservoirs. The stream then again enters the porous limestones of the Lower Oolites, and flows over them down to Witney. The rest of the course is over the flat of the Oxford clay. The numerous mills on this stream, specially the important works at Witney, would be entitled to compensation if its waters are to be in any way appropriated, and, in the absence of facilities for the construction of reservoirs, it is difficult to see how this could be done. A site, in the valley of this river above Burford, has been suggested as suitable for an impounding reservoir. It shows in their most typical form the disadvantages that attend sites placed in districts where the subsoil is clay. The length of the suggested reservoir is 2½ miles, the maximum depth of water 44 ft. The gradient of the valley is fairly uniform, and works out at 16 ft. to a mile. Consequently from a point a mile and a half from the dam there would be, even when the reservoir is full, less than 20 ft. of water, and for the upper three-quarters of a mile the depth would be never more than 12 ft.

No. 2.—A site, which looks tempting, has been suggested on the Sherborne Brook, a feeder of the Windrush. But the reservoir would be situated almost wholly on the open fissured limestone of the Inferior Oolite, some small patches at the bottom reaching down to the incoherent Miford sands. There is every facility for the escape of the water through these measures, and its discharge into the adjoining valley of Haycroft Bottom. This could be prevented only by carrying a puddle-trench round the greater part, if not the whole, of the reservoir. The depth of such a trench would not be less than 100 ft. and its length 7 miles.

No. 3.—River Evenlode and River Cherwell.—The geological conditions here are so nearly the same as those of the streams already described that there is no necessity to particularise them. But their case presents difficulties which have not so far arisen. The Worcester branch of the Great Western Railway runs along the Evenlode Valley; the valley of the Cherwell is traversed by the Birmingham branch of the same railway, and by the Oxford Canal. Both railways and canal are so little above the level of the stream that any reservoirs constructed in the main valleys would submerge both. The canal also is supplied at various points from the Cherwell. Sites have been suggested in the basins of the Cherwell and the Evenlode, which are objectionable, because they are situated on open porous limestones. One of these near Moreton Pinkney has the whole bed underlain by pervious marlstone. I do not see how such a reservoir could be made water-tight, except by completely surrounding it by a puddle-trench. The length of such a trench in this case would be at least ten miles. It might be possible to construct reservoirs in some of the branch valleys, and supply them with water taken in part from the main stream higher up. But in some of the cases which I examined such reservoirs would be of large area and small depth, impounding only small quantities of water in proportion to the space they occupied, liable to be drained down and choked by vegetable growth, and in other respects unsuitable as sources for a town-supply. I have found that this would be the case with the following sites that have been suggested in these branch valleys.

No. 4.—On Sor Brook, Broughton, near Banbury. Here, too, the site is wholly on pervious marlstone, and a reservoir could be made water-tight only by works of a most extensive and expensive character.

Nos. 5 and 6.—On River Swere, near Adderbury, and on a stream near Deddington. Both these sites possess, to a large extent, the same disqualifications as the last.

Nos. 7 and 8.—Two other suggested sites are on the river Dome and on the river Glyme near Woodstock. In both these cases the underlying rock is the limestone of the Great Oolite. To make these water-tight, puddle-trenches at least 150 ft. deep and several miles long would be required.

No. 9.—River Thame.—The conditions in the case of this river valley are very much the

same as in the case of the river Ray. For nearly the whole of its course it runs over Kimmeridge clay. I should not have thought it necessary to mention this stream at all, if it had not been that a site has been selected on it near Hardwick for an impounding reservoir. This site has all the disqualifications which have been already pointed out as attending reservoirs placed in valleys where the substratum is clay.

In his examination, Professor Green said that he had had many opportunities of seeing reservoirs in the course of construction, and he had mapped a good deal of the country about Banbury, Buckingham, and Oxford. Last year he spent a good deal of time in examining the basin of the Upper Thames and all its branches, and he had more recently examined the sites of the proposed nine reservoirs. In answer to the question, "Have you considered whether any additional supply of water could be obtained for London from the upper part of the Thames basin?" he said,—"I came to the conclusion that it was hopeless to attempt anything of the kind. I saw very clearly that, in certain parts of the limestone districts, there were many valleys abundantly supplied with water, and that there were sites in them where the shape of the ground was suitable for the construction of dams that would impound large quantities of water; but I also saw that those limestones were so open and fissured that it seemed absolutely hopeless to make such reservoirs water-tight, except by works of great magnitude and enormous expense far out of proportion to the amount of water they would retain. Then, again, in the clay districts, I noticed that the valleys are broad and open, with very gentle slopes, and that to impound any quantity of water you would have to have very long dams, and that the reservoirs must be all of them shallow. In fact, I came to the conclusion that certain reservoirs might be made which I should not call reservoirs, but which I should call overgrown puddles. They would be water-tight, but I should certainly not think of calling them reservoirs. Overgrown puddles is, I think, the only term I could apply to them. There are other places where you could impound large quantities of water and deep bodies of water, but they would not be water-tight."

No. 1, he added, lies in a broad, flat-bottomed valley, the bottom of which is formed of the Lower Lias clay, a perfectly impervious stratum which may be trusted to hold water certainly. But towards the northern end the reservoir encroaches on the Middle Lias, which is not very thick. The Middle Lias in that district consists of the rock bed at the top and loamy sands underneath. They contain a good deal of argillaceous matter, but are not sufficiently impervious to be safely trusted to. Therefore, part of the puddle trench would have to be sunk down through these Middle Lias beds into the Lower Lias. That would involve no very great difficulty. The thickness probably is not above 30 ft. or 40 ft.; but then there is the danger to be combated of the water getting round the ends of the puddle wall and escaping that way. That can be met by wing trenches, and these would have to be three-quarters of a mile long on each side. In depth they would, perhaps, not exceed 40 ft. The question is whether the expense would not be out of proportion to the amount of water impounded. A wing-trench must be carried alongside a reservoir for the whole distance that the water rests on the pervious Middle Lias. In estimating the value of the reservoir we must consider its depth. The maximum depth at the lower end is 44 ft., the length 2½ miles, and for the upper three-fourths there will be a depth of only 12 ft. when the reservoir is full. When it is drawn down you would have three-quarters of a mile of noisome swamp full of all sorts of pestilential growths. But suppose it was merely a compensation reservoir for the Thames! Well, it would send into the Thames practically polluted water, which might perhaps be improved on the way to the intakes.

No. 2 is almost entirely on the limestone of the Inferior Oolite which is a very open jointed porous rock. There are some patches in it which cut a little lower and get into the Midford sands, which are incoherent sands, utterly unable to hold water. The Inferior Oolites spread for a considerable distance all round. A puddled trench must be carried through all the Inferior Oolite down to the Lias clay. It is not easy to estimate the thickness of the Inferior Oolite there, but it is not less than 100 ft.

At Cheltenham it is over 300 ft.; near Oxford 30 ft. His impression was that the only way to make the reservoir hold water would be to carry a puddle-trench, possibly 100 ft. deep, all round it. In other words, it was practically an impossible site.

No. 3 would rest almost exclusively on Middle Lias,—the rock bed, which is by far the more dangerous of the two subdivisions. There is very little, indeed, of miscellaneous alluvial deposit. In several places the bare rock bed of the marl comes to the surface. It is not one of those flat-bottomed valleys that is naturally puddled; it is very mouldy, and mounds largely diminish its capacity. The rock bed is always a fissured, ferruginous limestone. The construction of a dam, so that water would not go underneath it, would not be a serious matter, but it is possible the wing trenches might have to go all round the reservoir, one arm of which is four and the other two miles long. He joined issue with Mr. H. Woodward as to the slopes as well as the bottom being coated with clayey material. He could not say whether the marlstone was water-logged or not. Where the stream was flowing, there was a little alluvial matter. The reservoir will be a terribly shallow pan. The maximum depth is only 35 ft., and one arm is four miles long. The sides are too steep to allow of any of this natural puddle lying upon them. Along the sides of these valleys in the Oolite limestone rocks, the bare rocks crop to the surface, or, if it is a ploughed field, the field is covered so thickly with rubble that the bare rock must be immediately beneath that. Really, the sides of the valleys are practically formed of bare rock,—a rock bed of the marlstone. Would not the sides of this valley be Upper Lias, as suggested by Mr. Woodward? The water would not lie on the Upper Lias for more than one-hundredth part of the area. There are one or two outliers of the Upper Lias, and the marlstone just touches them at one or two points.

No. 4 rests very largely, not "wholly," as he had stated, on porous marlstone; but this is the pressure greatest. The sides towards the lower end are almost entirely of marlstone, and for a long way up the south side the upper part of the water would rest on the rock bed of porous marlstone. A portion of the hed is on the Lower Lias, as Mr. Woodward said, but towards the lower part of the reservoir by far the greater part of the water would be resting on the pervious rock bed. Handed Mr. Woodward's map, the witness adhered to his opinion.

No. 5 rests largely on the Lower Lias clay, but touches the Marlstone along the southern margin and at the lower end. Mr. Rofs may have made changes in his plan to obviate difficulties in the making of the dam, but doing that cannot alter the fact that a large portion of the hed will be on the porous rock bed of the Marlstone. The faults have affected the water-tight character of a reservoir very seriously. If it had not been for them, the hed would be on the Lower Lias clay. As it is, they have let in a long strip of Middle Lias, so that it comes to form the hed, a good deal of it probably the rock bed. You have to reckon with the water getting round the end of the puddle wall, and it would be difficult indeed to make the reservoir water-tight.

No. 6 is not open to serious objection as to water-tightness, but it is a horribly shallow pan. It is about 2½ miles long and 35 ft. deep at the lower end, but the upper part would be a mere swamp.

Nos. 7 and 8 cannot be judged by the lake in Blenheim Park. In each case the ground is the same. There is a long, narrow, steep-sided valley, with a flat bottom, covered with alluvial deposit, and fairly water-tight, but the sides in the steeper parts are practically bare rock at an angle of about 20 deg. In the ploughed fields the rubble was so fresh, and the percentage of rubble stones so large, as to show that the rock rubble mixed up with clay; it was lumps of good, clean limestone. The clayey residue would not lie on such a slope, because every shower would wash it down. The lake in Blenheim Park is in such a valley. The agent says, as the result of soundings, that it varies in depth from 14 ft. to 20 ft. The Duke of Marlborough writes that a certain amount of water leaks under the puddle wall, so that, with the small depth of water resting on a naturally puddled bottom, the lake is not water-tight. With 40 ft. or 50 ft. of water resting on this bare rock, he did not see how it could be prevented running away. The lake

dam might not have been so well constructed as it would be now, and there is no reason to apprehend that the dam itself leaks, but the water finds its way through the porous limestone underneath the puddle of the dam. These valleys he did not see how you could make more than just shallow pans, or sheets of ornamental water like that in Blenheim Park. Mr. Woodward mentioned that in the limestone of the Great Oolite, there are layers and hands of clay and marl, and that diminish the permeability of the rock, but there is not enough to render it anything like impermeable. These clayey bars are not continuous; they are wedge-shaped things, and they thin away from place to place. Mr. Woodward has been too sanguine, thinking that the solution of limestone and the accumulation of an insoluble residue over the slopes would make a reservoir practicable. Mr. Woodward has spoken of the lower beds of the upper zone of the Great Oolite as containing much clay as to be practically impervious; but he could not recall any example that would support that view; and if he were right it differing from Mr. Woodward, a puddle trench would have to go down through the two zones of the Great Oolite until you got to the Upper Lias clay, making a depth of 150 ft. He would not live near one of these reservoirs unless the wing trenches were carried all round, and they would be eight miles or more.

No. 9 would be perfectly water-tight, would be possible to impound such water as a shallow pan like that would hold. There would be no difficulty or risk.

To Mr. Hill: Some of the sites are eminently unsuitable on geological grounds for impounding large bodies of water. Even a little lake not more than 20 ft. deep is not made water-tight by the sheet of natural puddle. I had been told they were going to make a lake in Blenheim Park, and I had looked at a geological map, I should have said, "Great Oolite,—it will not hold water." I go there and I find it does hold water, and I want to account for it. The explanation, accepted by everyone, is that there is a sheet of natural puddle, fairly water-tight; but the sheet naturally covers the valley bottom, and does not reach up the slopes. So, directly you raise your dam high enough to bring the water in contact with the slopes, it will run away through the open rock that forms those slopes; and they are so steep that the deposit will rest upon them. The Duke in his letter says, "I do not believe the hed of the lake to be puddled, though I have no certain information on that point."

Additional Sites for Reservoirs.

Mr. Topley made the following suggestions:—

A.—North of Banbury.—An excellent site for a reservoir exists 1½ miles north of Banbury east of Hanwell, on a tributary of the Cherwell. The reservoir would be on Lower Lias clay, the dam also; but, perhaps, just touching the lower clayey beds of the Middle Lias on its eastern side. The drainage area is about 12 square miles, or 7,600 acres; this is mainly Lower Lias, with a Middle Lias. The district is thinly populated. The area of the reservoir would be about 700 acres; the dam 35 ft. or 40 ft. high in the middle, and about 900 yards long; top-water-level about 360 ft. above Ordnance Datum. The capacity of the reservoir would be probably about 2,000,000 gallons.

B.—North of Thame.—On a tributary of the Thame, between Chilton and Cheersley. This reservoir would be on Kimmeridge clay; the extreme northern end on Corallian beds, which are here mainly clay. The drainage area, Kimmeridge and Corallian clays, with outliers of Portland Beds and Lower Greensand, covers about ten square miles, or 6,400 acres. The area of the reservoir would be about 950 acres; the dam about 20 ft. high in the middle, and about 450 yards long; top-water-level about 240 ft. above O.D. The capacity of the reservoir would probably be over 1,200,000 gallons.

C.—Near Buckingham.—This is a reservoir proposed by Mr. Baldwin Latham. It is on a tributary of the Ouse, but the water could be brought by a cut into the upper part of the reservoir, the bottom of which would here be excavated. The cut, in part a tunnel, would be four miles long. The drainage area is entirely on Oxford clay, in part covered with drift gravel, clayey gravel, and boulder clay. The dam, just above the village of Padbury, will be out down

through the Cornbrash, but the whole of the reservoir will be on Oxford clay and the overlying drifts. This reservoir is estimated by Mr. Latham to deliver fifty million gallons daily during 100 days. The floods in the Ouse are a source of much trouble and expense. This reservoir would greatly tend to diminish them, and thus would be of local benefit, besides largely aiding the dry-weather flow of the Thames.

In the course of his examination Mr. Topley said,—"There can hardly be any difficulty about the additional sites A and B; they are almost entirely of impervious clay, with just possibly a little bit of the upper part of more or less porous beds which can be dealt with.

Mr. Hill: A would have a dam of 35 ft. or 40 ft. high. If you draw that down 10 ft., there will be very little water left in it, and a large area of the upper part of the reservoir will be all bare?—Yes, that applies to all shallow reservoirs.

Mr. Robt. Etheridge, F.R.S. of London and Edinburgh, submitted to the Commission a paper upon the Upper Thames and its tributaries, exhibited a large map of the river basins, and banded in tables showing the resources of those areas, which amounted, for example, to 20,000,000 gallons daily at Lechlade. He suggested that this water should be stored in reservoirs, which might be constructed at Lechlade, at Castleheaton, at the mouth of the Windrush, and at the mouth of the Evenlode. These were sites where reservoirs could be excavated from the Oxford clay entirely, in order to store water for the purpose of equalising the flow of the Thames. At Cassington one could be constructed partly in the Oxford clay. Another place was Sandon, in Hertfordshire; and at the mouth of the Colne, east of its confluence with the Thames beyond Lechlade, a reservoir might be constructed to store the water of four rivers. No reservoirs can be made above Lechlade out of the Oxford clay. No reservoirs can be made in the Colne, Marston Brook, or Cherwell, which could be watertight. Whatever water is to be used is to be taken at Lechlade or St. John's Lock or Weir. The reservoirs he suggested could be constructed only by excavation, not by embankment.

Proposed Leaking Reservoirs.

Mr. Topley, in concluding his evidence, said there was one thing he mentioned with some reluctance, but it had occurred to him as worthy of consideration whether the springs of the upland areas of the Thames,—the underground storage of the porous strata,—could not be artificially increased by the construction of reservoirs that would slowly leak. Engineers, he said, will probably consider it quite a visionary scheme, but it is merely an expansion of an idea which old William Smith, the early English geologist, had, and which he actually applied on a small scale to the supply of Scarborough. He was a great canal engineer, and he suggested that it should be applied to the supply of some of the canals in central England. What I think is that on certain sites which may not be good enough to hold water permanently through the dry weather and so he used as storage reservoirs, it will be possible to build a dam across, keep the water back, and allow it to percolate slowly through the porous rocks and come out as springs. One would want to know whether they would hold water long enough to yield a large supply during the driest weather. It would take a long time for the water to saturate the rocks and run out, and it would overlap the dry seasons. The object is to increase the dry weather discharge artificially by making artificial springs in areas where they are not known, damming the water back in the porous rocks and allowing them to leak. To some extent the joints would be filled up, by the deposit brought down by the floods, and that is one of the points of the engineers in recommending sites that are apparently not as good as they might be. Of course, one would not attempt to make such a reservoir as I suggest in an area at all impervious; it should be a moderately pervious area. Possibly some of the reservoirs suggested here would serve the purpose, and two of them would not. If they cannot be made absolutely water-tight they would slowly leak, and in slowly leaking they would make fresh springs, and that would increase the dry weather flow of the Thames.

The Claims of Hertfordshire.

Mr. John Hopkinson, F.G.S., submitted a statement, accompanied by numerous returns,

on the rainfall, evaporation, and percolation of the county. These were the results of special study and observations carried on during the last sixteen years. The area of the county is 630 square miles. The conclusions finally arrived at are that the rainfall is 26.05 in.; the percolation 10.36 in., or 39½ per cent. of the rain; and the evaporation 15.75 in., or 62½ per cent. of the rain. The application of these figures is that the county may be injured by pumping for London from the chalk about the point where the Colne leaves the county at Herefield; and the area of the Colne about that point is 235 square miles,—195 on chalk and 40 on tertiary, Reading beds, and London clay. The county is also affected by pumping in the Lea valley, whose area above Fielde's Weir is 410 square miles,—295 on the chalk, 115 on the tertiaries named. The two areas ordinarily yield 132,000,000 gallons daily, of which 33,000,000 is derived from rain running off impervious beds into surface streams. It is essentially a winter supply, and the flood waters, coming off heavily-manured land, are unfit for drinking purposes. The rivers are chiefly fed by the natural overflow of the water in the chalk, which finds its way to the surface in springs, most of which are in the banks and beds of the rivers. Where there is no impervious bed under a river, the water would disappear if the plane of saturation were lower than the river-bed; and it would be lowered by increased pumping from the chalk. To the pumping in the valley of the Lea is attributed the drying up of the Colne at Potterells and at North Mimms, where a mansion with a north aspect overlooks the bed of a river, which is dry, except in wet winters. The Colne joins the Ver, which is now the main stream, but cannot have been so always, else the united stream would have been the Ver and not the Colne. Above the junction the Colne has the greater catchment basin, but the Colne is here much the smaller, because so much water is lost to it in swallow-holes. The Ver drains a large area of permeable beds. If more water were abstracted from the chalk at Watford, Rickmansworth, or Herefield, the springs in its bed would be converted into swallow-holes, and the same would happen to the Gade, its tributary the Bulbourne, and the Chess. Water will percolate more rapidly through layers of flints than through solid chalk. It might be possible to abstract water from a lower bed of flints without immediately drawing it out of a higher, but, as the whole upper chalk is permeable, sooner or later the water in the higher bed must percolate to the lower. Therefore a guarantee that a well will be carried a certain depth into the chalk, and will be stoned to that depth and made quite watertight so as to prevent water getting into it from an adjoining stream flowing over the chalk or from some other shallower wells in its vicinity, is of no value. Hence, short experiments to test the effect of pumping in one well upon the level of another are of no value. It may be a long time before the abstraction of water from a deep well affects the flow of an adjoining stream on the chalk, but it is certain that it must eventually do so. In conclusion, he urged that the water raised in Hertfordshire for its towns being returned to the streams before they left the county did not reduce the volume of the Colne and Lea lower down; but if the water were taken from the county and conveyed to London the rivers would be completely robbed of it; and if it were taken from the chalk their volume would be permanently reduced.

Examined upon his statement, Mr. Hopkinson said that his object was to show the proportion of percolation to rainfall, and the amount of rainfall that was available for supply. The mean rainfall he took at 26 in., the percolation at about 6½ in., and the evaporation at 19½ in.; or of the rainfall 74 per cent. was disposed of by evaporation and 26 per cent. by percolation. This gave daily yields of 57,500,000 for the Colne, and 51,500,000 for the Lea, which ought not to be supplemented by flood waters, because they were unfit for drinking purposes. It was disadvantageous to the county to pump water from the chalk at all. The injurious effects would be felt in dry seasons, but not in wet ones. Too much water was being taken at present. In reply to Sir A. Geikie, he said that he had twice seen the effect of water flowing over the chalk and not percolating. It is so rare that he once went to Hitchin to see it, and he saw it also once in the neighborhood

of Berkhamstead. In both cases the chalk was scooped out, while as a rule the water permeates the chalk. He had seen water disappear from the Colne and the Colne almost dry, and then he had seen the water flowing lower down. Therefore, he assumed that the general flow of the water in the chalk is parallel with the flow of the river. The Bourne flows into the Gade near Berkhamstead, once in a few years, but, when it is dry for the most part, it is seen flowing where there is a little depression in the surface.

Mr. Urban Armstrong Smith adduced many details in support of Mr. Hopkinson's case.

Sir F. Bramwell on Chalk Supplies.

Sir F. Bramwell, examined on that part of his statement which dealt with this branch of the subject, said that the water supply for the metropolis could, be thought, be very largely increased from wells without detriment to the streams on the surface. The East London Company in many places reached the chalk by piercing the clay above the chalk. They found the water in the chalk, and the water rose to a certain height when they were not pumping. That height was much below the depth of the surface streams. If pumping lowers the water-level by 50 ft., that does not bring the surface-water down. Asked "Do you not think it is the chalk-water that flows into the stream rather than the streams into the chalk?" he said, "I think both take place. Where you have chalk-water overlying impervious clay, there you get a spring going into the streams." He agreed that on the whole the floors of the streams were tolerably impervious, so that water came to them from the chalk, rather than to the chalk from them. If you lower the water standing in the chalk below the streams, you do not thereby deprive the streams of anything. If you sink a well and intercept a chalk stream coming out in a spring it would be different; but if you sink a well where the water goes into the chalk, and it has to find its way through subterranean conduits, the lowering of the level of the water in the chalk cannot have any effect on a stream.

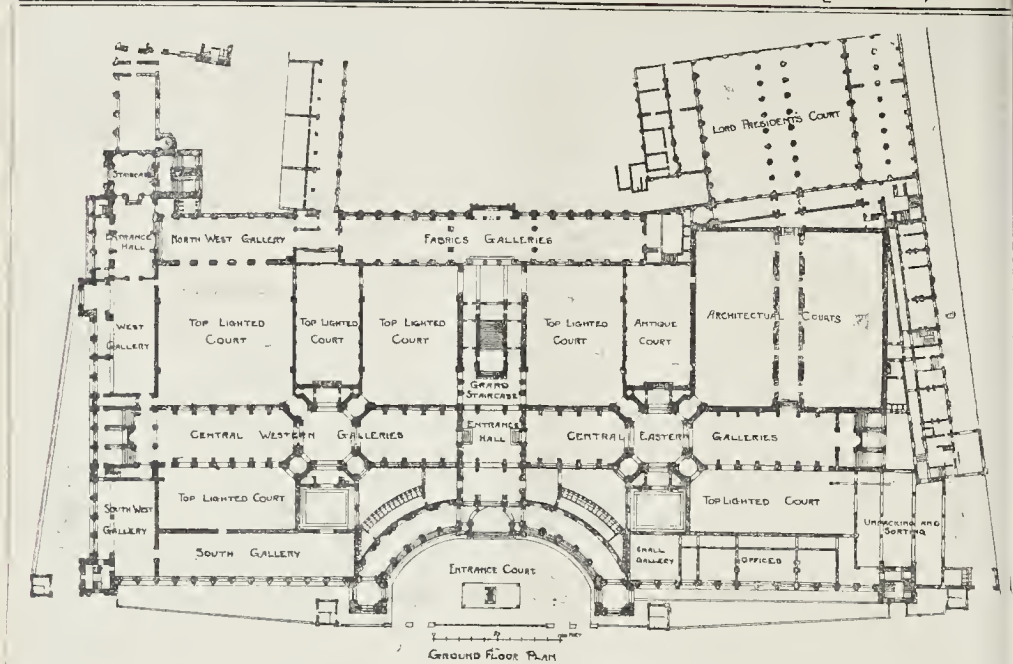
Chalk Supplies from Hampshire and Wiltshire.

Professor Robinson, besides proposing the Kennet Valley reservoir, said that the chalk in Hampshire and Wiltshire would yield a supply for 5,000,000 of people at a capital outlay of not more than 5,000,000, equal to about 33,000,000 per million gallons a-day. The working expenses would be about 70,000,000 a year, or less than one-third of a penny per 1,000 gallons delivered in London, and the softening of the water could be effected at a cost of a farthing per 1,000 gallons. In Hampshire 330 square miles of the upper gathering grounds of the rivers Test and Itchen would yield 77,000,000 gallons a day, calculated on the basis of utilising 6 in. of rainfall per annum from chalk areas, which have a total annual rainfall of 30 in. In Wiltshire, 300 square miles of the chalk area, which includes the Salisbury Plain district, would yield 70,000,000 gallons per day, on the same basis of utilising 6 in. out of a total rainfall of 30 in. These combined volumes, amounting to 147,000,000 gallons per day, could be intercepted at levels varying from 120 ft. to 195 ft. above Ordnance Datum, and pumped into a high-level aqueduct. The average lift for the whole would be 163 ft., which is considerably less than that of the existing waterworks. Out of the total volume of 147,000,000 gallons per day, nearly 100,000,000 gallons per day would be available at the highest level. The water thus intercepted would be pumped, with this comparatively small lift, into a main high-level conduit, and delivered by gravitation to London, to points at an elevation of 240 ft. above Ordnance Datum.

Sir E. Easton on Chalk Supplies.

Sir Edward Easton, C.E., said that he had been in practice forty years, and had designed and constructed upwards of fifty waterworks. Of the nineteen that immediately adjoin or are within Greater London, eighteen draw their water either from chalk springs or from wells and borings sunk in the chalk. These are:—

South Essex.	Watford.	Richmond.
Herts and Essex.	Rickmansworth.	Epsom.
Cheshunt.	South West	Sutton.
Enfield.	Suburban.	Croydon.
Tottenham.	Uxbridge.	East Surrey.
Barnet.	Leatherhead.	Gravesend.
Colne Valley.		



Competition Design for Completing South Kensington Museum: Submitted by Mr. John Belcher, F.R.I.B.A.

One, West Surrey, takes its water from the Thames. He had been personally engaged in constructing the works of South Essex, Herts and Essex, Watford, Sutton, East Surrey, and Gravesend. Water derivable from wells in the districts of the outside companies will be sufficient to provide a supply for those districts for at least double the population. The quantity of water available in the chalk stratum is doubtless very large. Most of the water which is absorbed into it runs by underground channels into the sea, without either appearing on the surface or serving any useful purposes. This is particularly and demonstrably the case in those districts of the chalk which empty themselves below the fault which exists to the East of London. A much larger quantity of the rain which falls upon its surface is absorbed, and much more passes away from it by hidden outlets, than has generally been estimated. Moreover the time during which the water remains in the chalk is much shorter than is generally supposed; that is, there is no such thing as storage for years or even many months. This can be proved most easily by taking the examples of those districts where the area of absorption is defined and the hidden outlets show themselves, as is the case almost always when the chalk abuts on the sea as at Brighton, Dover, Ramsgate, and D. al. At Brighton statistics carried over twenty years show that the rise and fall of the water in the chalk follows the fluctuations in the rainfall with great regularity after from three to four months. Similar observations at the Wisbech water-works extending over ten years show the same result. At Brighton the water is intercepted in its passage to the sea by means of tunnels, which are driven transversely to the fissures or channels which convey the water, and although out of one set of tunnels there can be pumped at least 5,000,000 gallons at the lowest time, this does not represent the total quantity passing through the chalk, as there is always a flow towards the sea. The area on which this water falls can be pretty accurately ascertained, as its northern limit must be the northern escarpment of the chalk, and its width cannot be taken at more than from two-and-a-half to three miles. About fifteen square miles of chalk probably feed the tunnels of the Brighton waterworks, and it requires 10 in. of percolation to provide the minimum quantity available, whilst at other times of the year the yield of the wells is much greater. On the average, two-thirds of the rainfall finds

its way into the chalk. Another proof of the passage of water by hidden channels towards the sea is the fact that rivers and streams fed by a chalk gathering-ground are so much smaller than those from an impervious area. Measurements of bridges on rivers flowing from contiguous watersheds show that in all cases water-ways are four to five times larger for rivers flowing from impervious grounds than those for streams from a chalk district. A much larger quantity of water may be obtained by means of tunnels from the chalk in both Kent, East London, and New River districts by the interception of the streams flowing through fissures and channels into the bed of the Thames.

As we have already stated, the Commission stands adjourned until the 15th inst.

Illustrations.

DESIGN FOR COMPLETION OF SOUTH KENSINGTON MUSEUM.

THIS is the elevation of the design submitted in competition by Mr. John Belcher. In regard to the proposed arrangement of the building, Mr. Belcher writes—

"The galleries being designed in blocks of two and three stories respectively, this grouping has been expressed in the elevations. The main central gallery of three stories, which covers the lofty Architectural Courts and extends along the full length of the site, has been arranged to maintain the line of frontage of the Natural History Museum. Two domes rise above the octagon galleries, and the height of main gallery returns along the centre portion of the Exhibition-road frontage, containing the Science Library, and is bounded by the furnace tower. In front of the main gallery are grouped the east and west wings containing the two stories of galleries and the offices, and connected by the quadrant forming the recessed entrance court. Four small towers are placed at the angles, two of which form entrances to the quadrant, all grouping together in the approach from the Cromwell-road. The lower two-storied buildings are enclosed by an architectural order which includes the quadrant, and is continuous throughout the whole of both frontages; the upper third story block is grouped behind this on both elevations. In the bays of

this continuous entablature which ensure harmony and breadth of design, the treatment of the galleries, staircases, offices, and entrances is freely expressed and varied. On the outer walls of the top-lighted galleries sculpture in low relief is introduced as a frieze, and the tiers of office-windows introduced where they occur. The colour-treatment of stone and red brick has been adopted to harmonise with the existing buildings.

The position of the furnace tower has not only been dictated by that of the heating and warming apparatus, of which it is a necessary part, but is also upon the highest part of the site, and so placed that it does not overpower either frontage or the adjacent buildings.

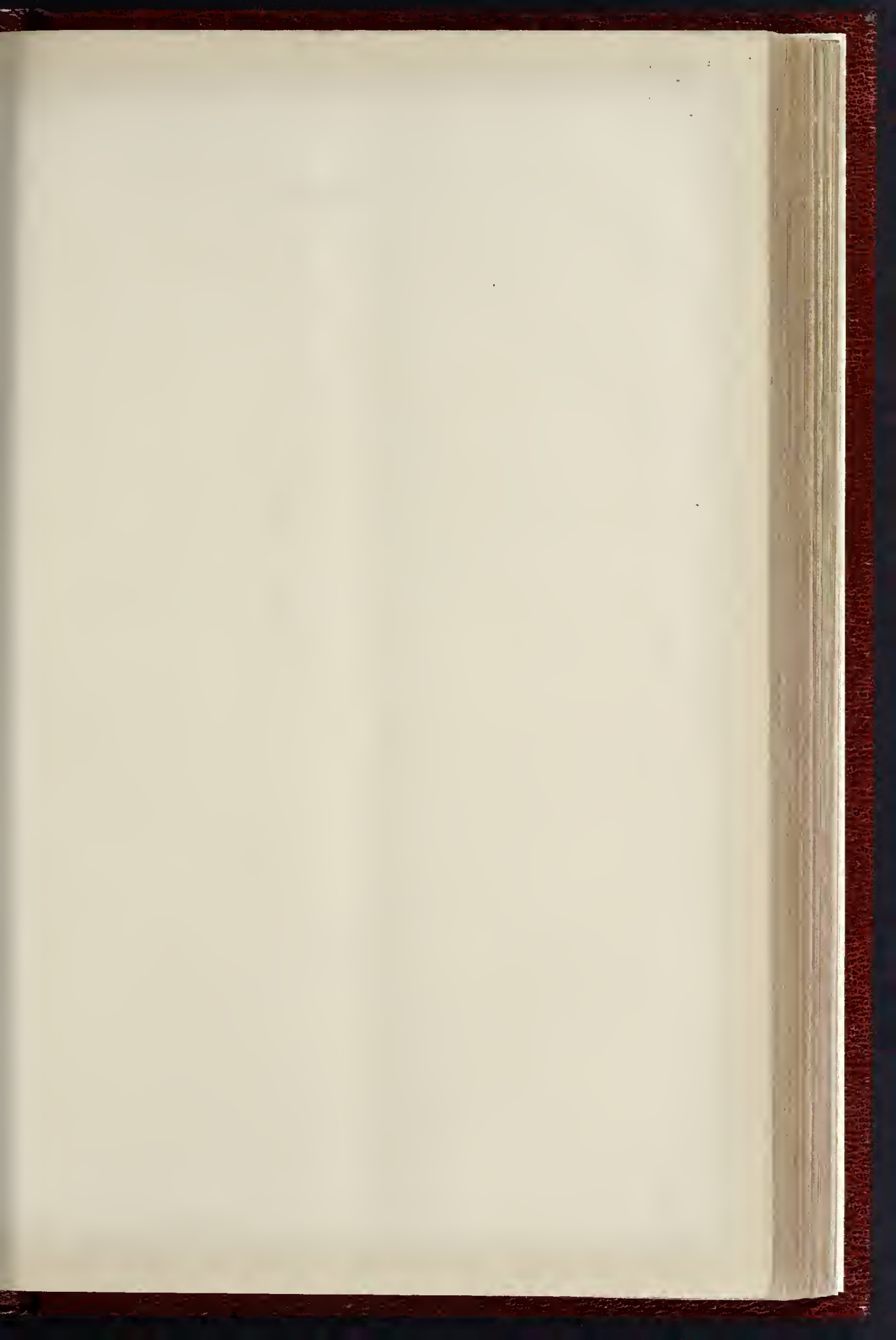
Interior.—The just proportions of the rooms, convenience of arrangement for exhibition, and the provision of ample light, have been the principles most considered. Among European museums and galleries visited and studied, those at Vienna designed by the late Dr. Semper, an early art director of the Science and Art Department, have afforded examples of the latest experience. The gallery at Dresden, also designed by him some years previously, and the new and old Pinacotheks at Munich, with the National Gallery and the old Museum at Berlin, may be named as illustrations of typical Continental museums, so that the arrangements and scale can be compared with the completed plan of the South Kensington Museum.

The central long gallery, which is 41 ft. wide, is lighted from both sides on the ground and first floors, except where it abuts on the wall of the architectural court.

The top lighted courts have roofs of the same type as that of the Italian Court, which offers advantages in the arrangements of blinds, &c. The small top-lighted courts are of the proportion of the spans of the Lord President's Court. The sections and plan of the picture gallery roofs have been carefully worked out, it being found that a picture is well lighted if it receives clear light from the sky at an angle of 45 deg., the spectator's eyes being free of direct light and reflected lights from all surfaces avoided.

The perpendicular rays of light must be intercepted on the crown of the skylight, being very productive of reflected lights from the floor."

*** As it is not usual with us to publish drawings which have previously been given to other architectural journals for publication,



THE BUILDER. NOVEMBER 12, 1892.

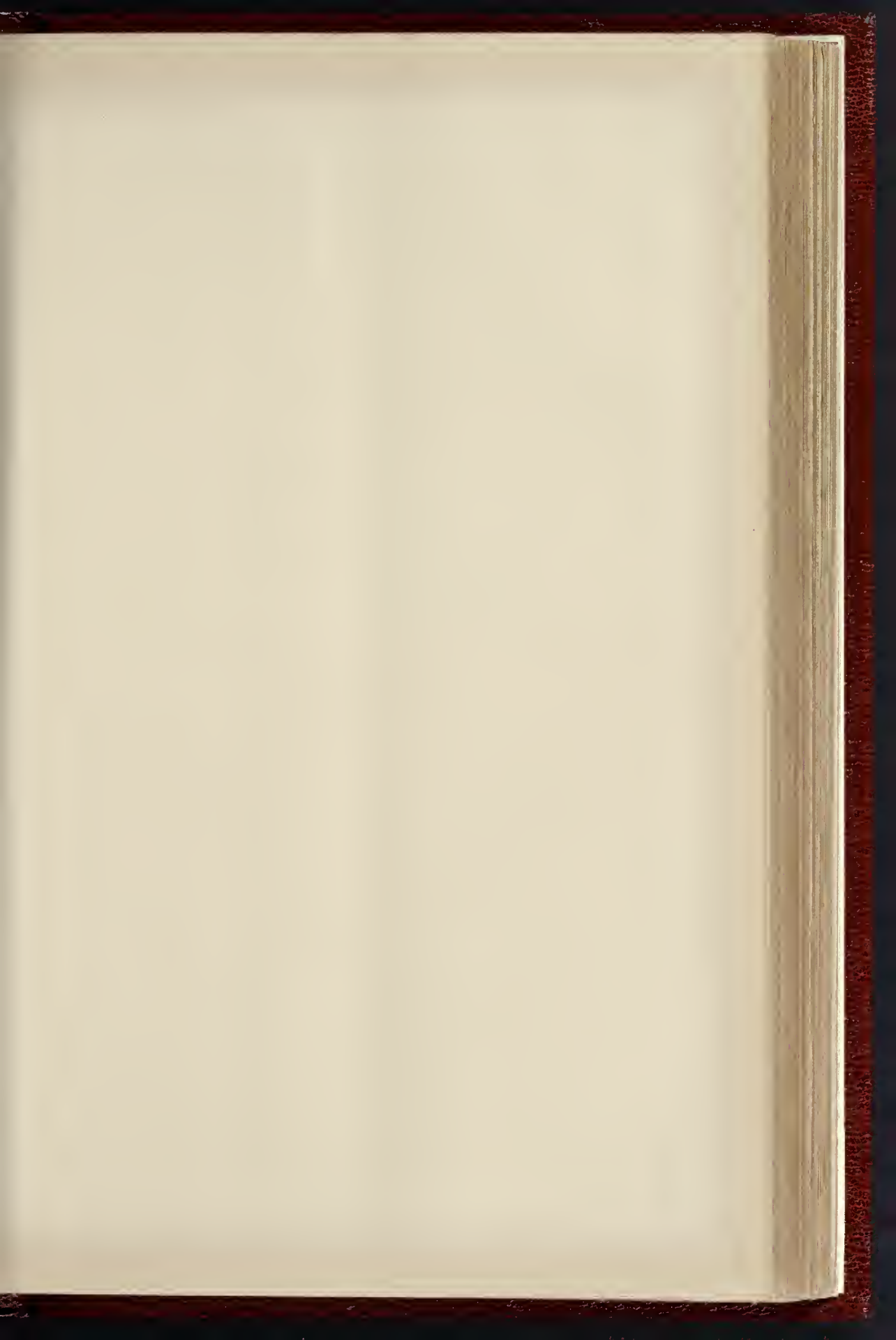




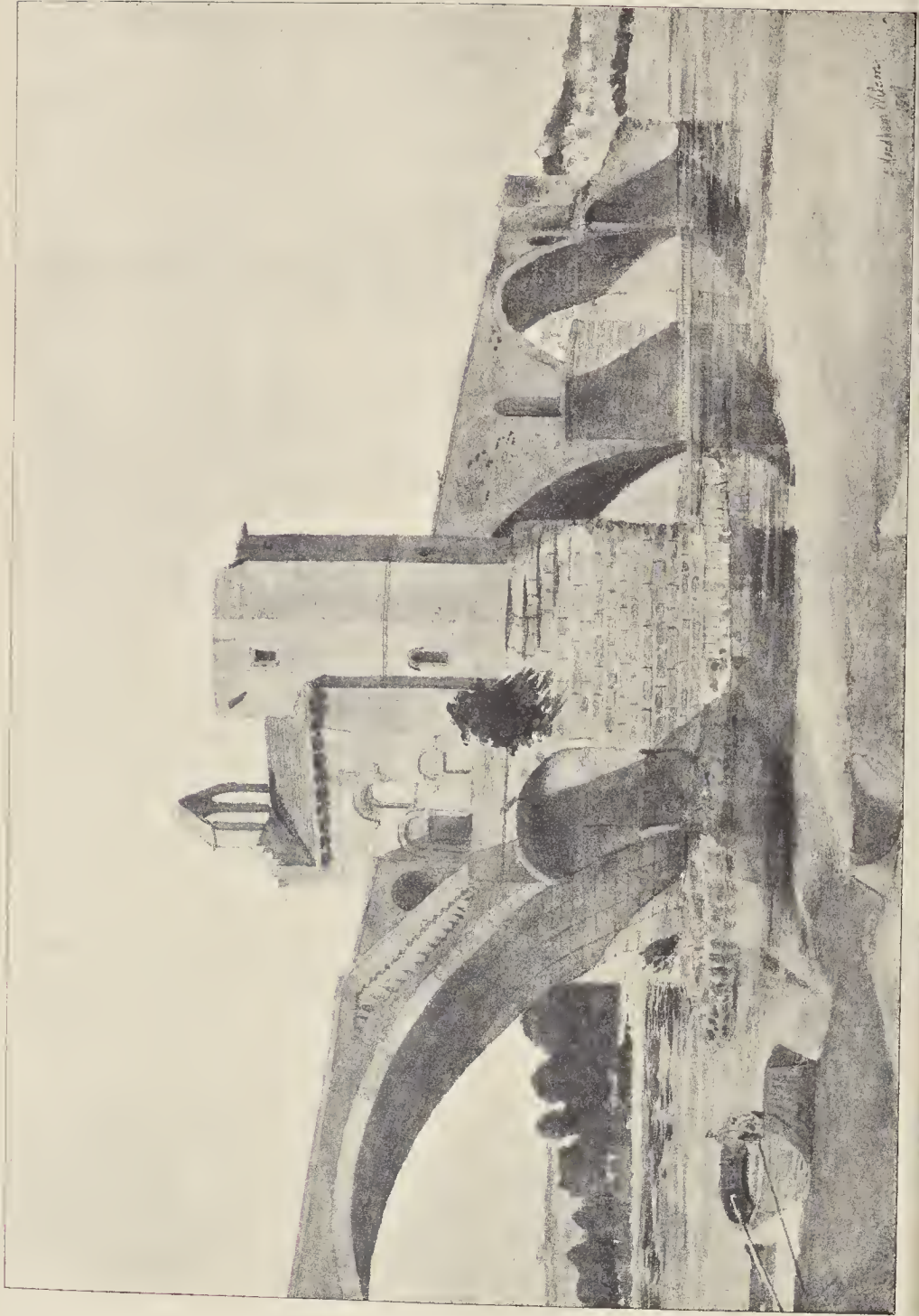
INK PHOTO SPRAGUE & CO. 415 EAST HANCOCK STREET, BOSTON, MASS. U.S.A.

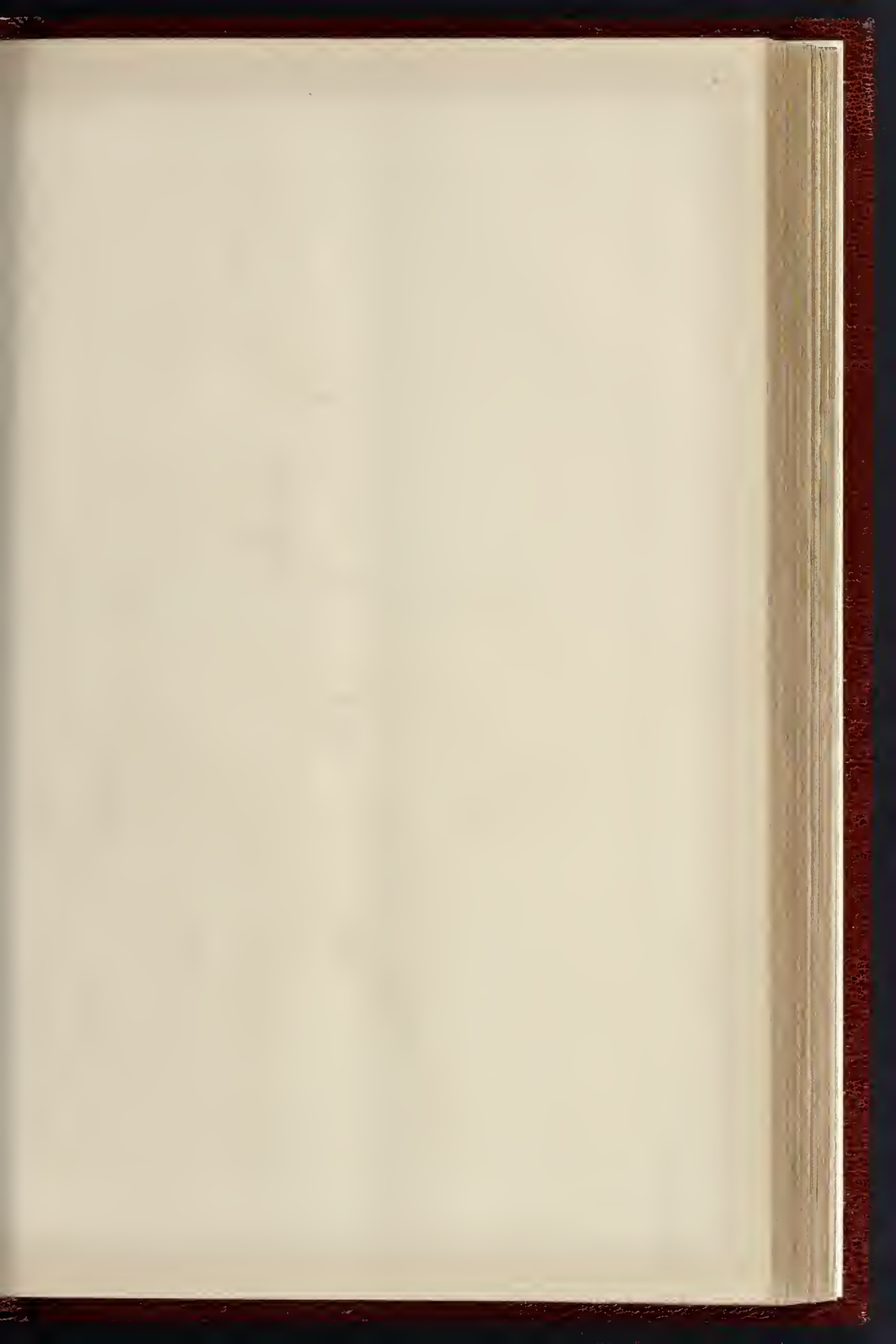
NEW PREMISES, HEATH STREET, HAMPSTEAD.—MR. KEITH D. YOUNG, F.R.I.B.A. ARCHITECT

Royal Academy Exhibition, 1892

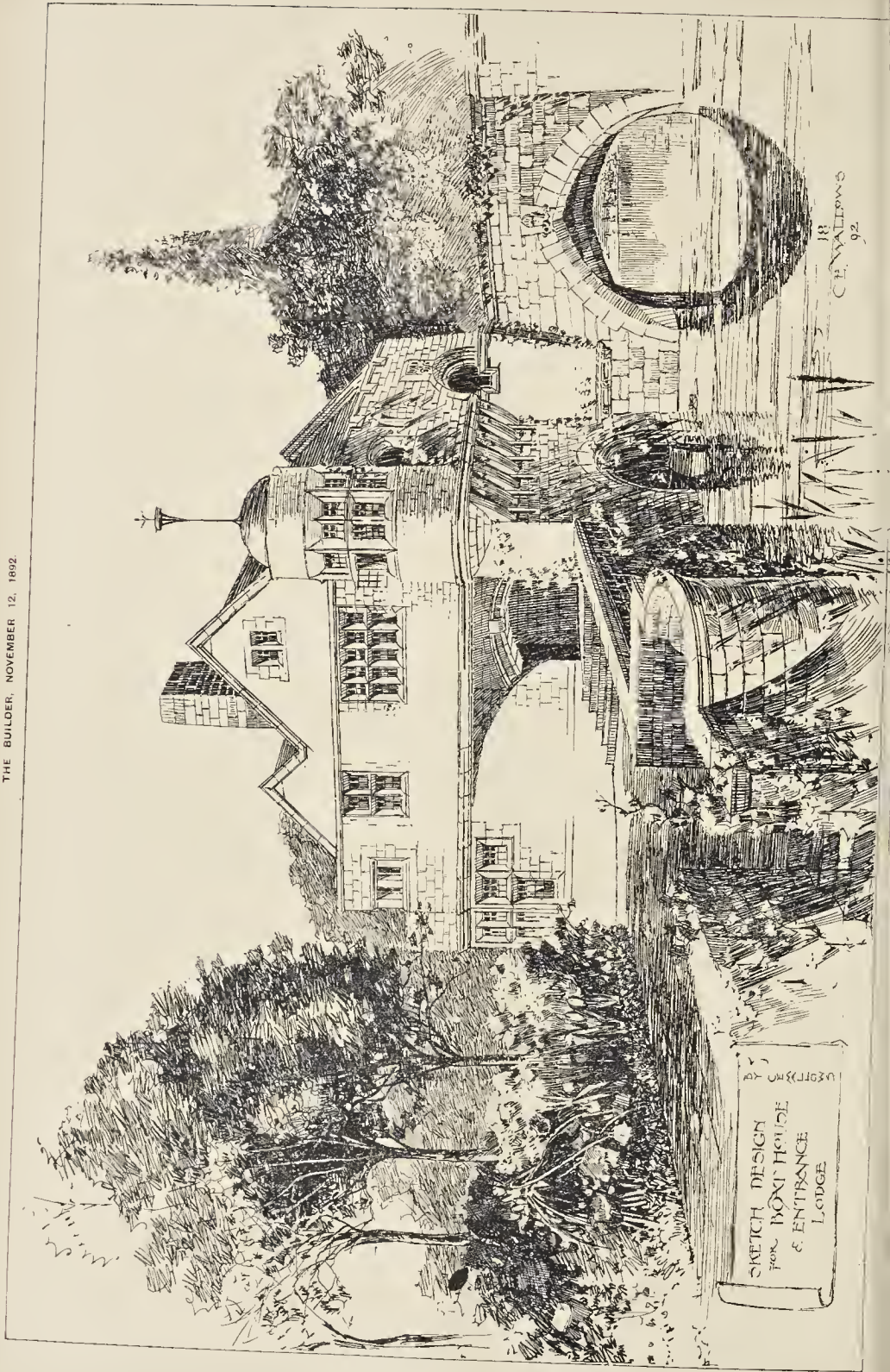


THE BUILDER. NOVEMBER 12, 1892.





THE BUILDER, NOVEMBER 12, 1892.



SKETCH DESIGN
FOR LODGE
& ENTRANCE
LODGE

18
C. WALLINGS
92

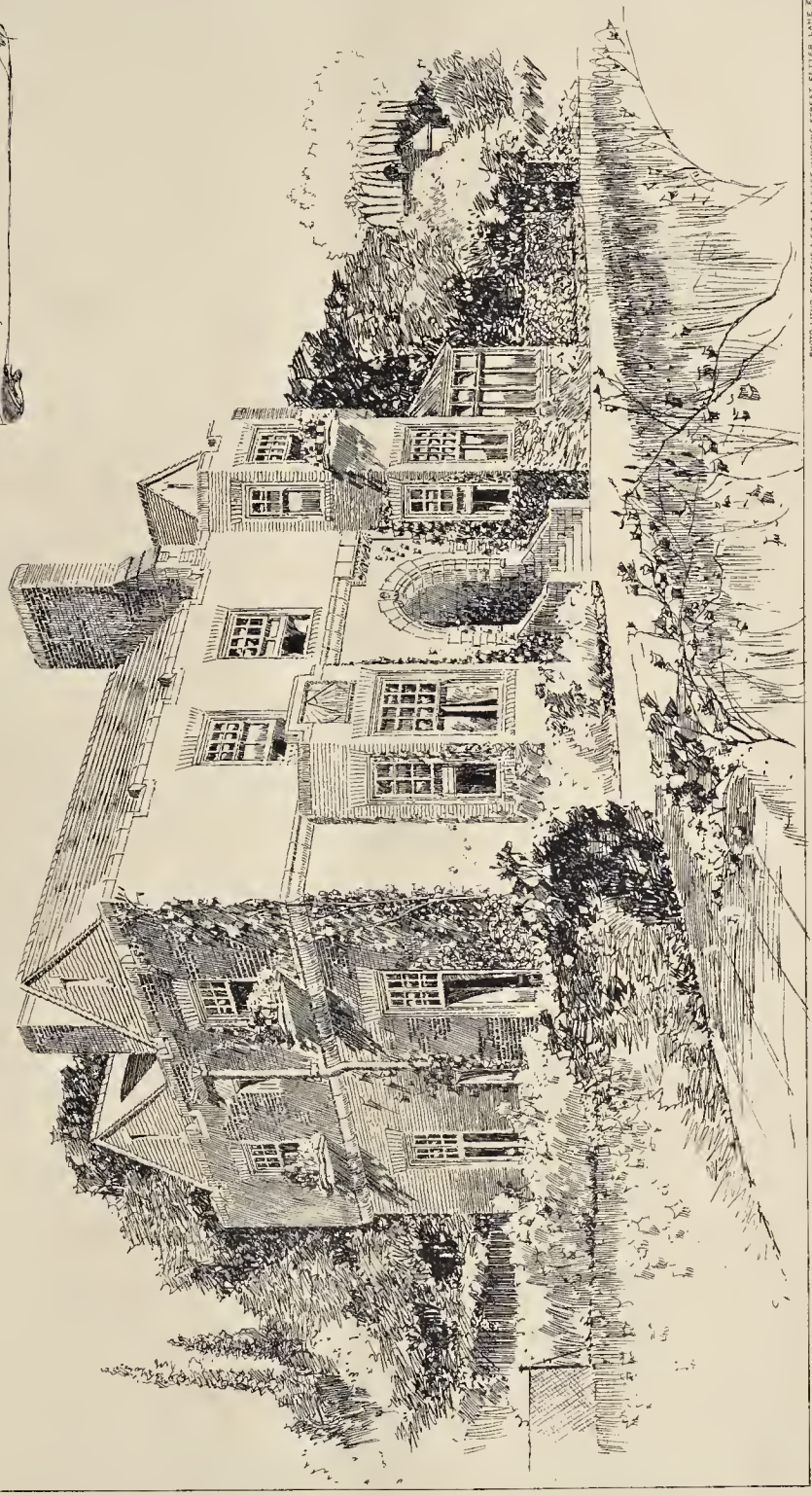
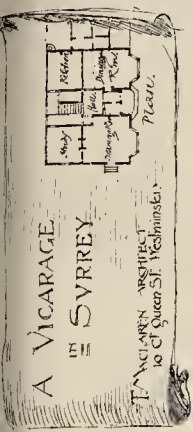
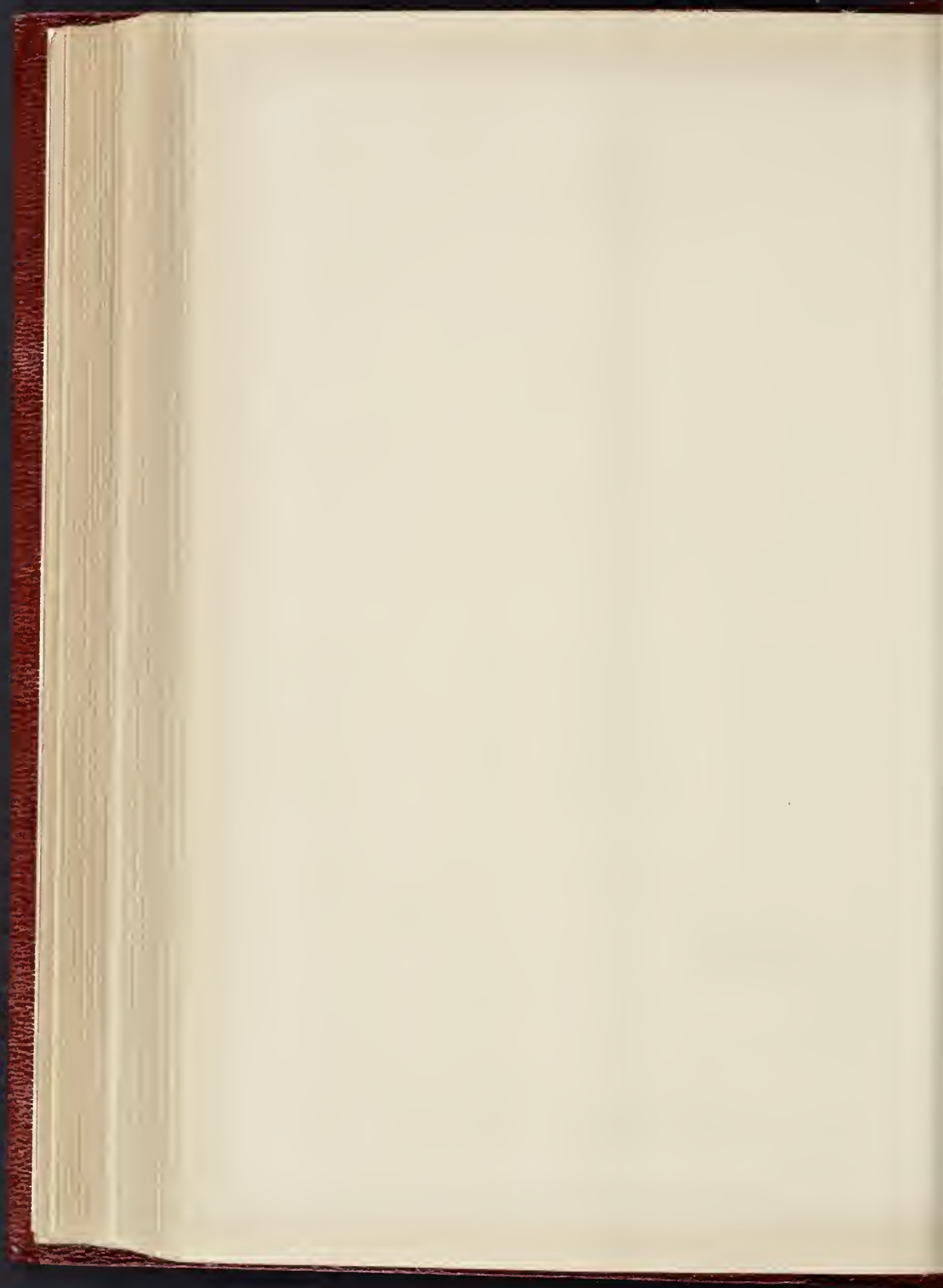


PHOTO-LITHO SPRAGUE & CO. 4 & 5 EAST HADING STREET, LONDON, E.C.

Royal Academy Exhibition, 1862.





LEANING TOWER, SARAGOSSA NOW IN COURSE OF DEMOLITION.—FROM A DRAWING BY MR. HEBER RIMMER.

INK PHOTO SPRING & CO. 45, 47, & 49, ST. MARK'S LANE, E.C.

and as this elevation has appeared in two other journals, a word of explanation may be necessary. Our contemporary the *Architect* published several of the drawings of this design (of course with Mr. Belcher's consent), but as this elevation was there given on a very small scale, and as it has since received a place of honor in the Architectural Room of the Royal Academy, we considered a publication of it on a larger scale was not an infringement of the spirit of our rule. In regard to the other previous publication, we have Mr. Belcher's authority to say that the drawing was published not only without his permission but to his great displeasure, by persons who seem to think that if they are once allowed to get a camera into a room full of competition drawings, the drawings are so much plunder, to be annexed without the ceremony of asking the permission of the architects, or without caring whether they wish it or not. The fault may rest partly with those in charge, who are not sufficiently strict or not sufficiently alive to the architect's right to have his work consulted as to publication; but it is perfectly certain that no journal which has any sense of an artist's right in his work would publish his drawings without his permission being obtained or even asked for. Not long since we published an indignant letter (much stronger in its original expressions than in the form in which we printed it) from an architect whose design in a competition had been similarly "looted," of course by the same agency; and it will probably be advisable for architects in future, when competition drawings of any importance are to be exhibited, to make a stipulation that their drawings are not to be photographed for publication by anyone who does not show their written permission, which will be the only way to put a stop to these predatory habits.

NEW PREMISES IN HEATH-STREET, HAMPSHIRE.

The ground floor of these premises is entirely devoted to the business of a dairy company. In front is a large hall, which is partly used as a retail shop, partly as a working dairy, and part is screened off by a walnut-wood framing, about 8 ft. high, to form offices.



The walls are lined with faience tiles, supplied and fixed by the Burmanoffs Company, the iron columns being encased in the same material. The yard at the back is covered by a glass and iron roof.

The first floor, above the milk dairy and washing place, contains dormitories and a common sitting-room for unmarried men in the employ of the Dairy Company. The upper

floors, over the front portion, are residential flats. The contractor for the general work was Mr. Toms; the carving on the front was carried out by Mr. Thomas; and the artificial stone paving was laid by the Patent Paving and Construction Company.

The whole of the work was supervised by Mr. Dalton, clerk of works. The architect is Mr. Kelth D. Young.

The view of the front of the building is reproduced from a water-colour drawing by Mr. W. H. Atkin Berry, which was exhibited in the last Royal Academy.

BOAT-HOUSE AND ENTRANCE LODGE.

This design was made to serve both as an entrance lodge to a country house and the boat-house of a private club. The gatekeeper's rooms occupy the half nearest the Bridge, and are principally on the first floor, and reached by a staircase by the side of the entrance-gates; they include sitting-room, kitchen, and three bedrooms.

The club rooms are entered under the large arch shown in the drawing, and consist of committee and general rooms, and accommodation for the caretaker over. The general room is on the first floor, and occupies the corner with the balcony and turret. The materials are a warm yellow stone for the walls and red tiles for the roof covering. The estimated cost is 1,235l.

The drawing, by the architect, Mr. C. E. Malloes, was exhibited at the Royal Academy.

A VICARAGE IN SURREY.

The accommodation provided by this design is, in addition to that shown on the ground-plan annexed to the illustration, five bedrooms, dressing-room, bath-room, &c., on first floor. The materials proposed are red brick with stone dressings for porch, corbelled course for top story, and for parapet and chimney copings.

Hollow external walls are proposed, and roofing in Broseley tiles.

The architect is Mr. T. MacLaren; the drawing was hung in the last Royal Academy Exhibition.

BRIDGE OF ST. BENEZET, AVIGNON.

This rather famous bridge was first built in 1178-1188, but has had a very disturbed existence since. It was out in 1395 during the siege of the Pope's palace, and inadequately repaired in 1418, but the arch which had been rebuilt fell in 1602, causing the fall of three others with it. Two others fell in 1633, and it is reduced to four arches on the town side.

The floods rise to a great height on the Rhone at this point, and it was perhaps partly with the view of reducing the pressure of the flood water that the spandrels were pierced.

The chapel on the bridge is in two stories, one on the high level and the other approached by steps.

The illustration is from a drawing by Mr. A. Needham Wilson.

LEANING TOWER, SARAGOSSA.

The "Torre Nueva," as it was christened when built, was erected in the Plaza San Felipe in 1604. It leans 10 ft. out of the perpendicular, and is in general appearance Moorish in style, though considerably coarser in detail than genuine Moorish work.

This fine and interesting tower has been condemned for destruction for some months past; in fact, it was announced that it was to be taken down in June, but probably on account of the opposition to the scheme from some of the townspeople, who were not so indifferent as their municipal government to the destruction of a remarkable work of architecture, the destruction was postponed, but has, we understand, been commenced two or three weeks ago, and we presume the tower may be considered as a lost monument by this time. The plea for its removal is that it is not safe in its present position, which would have been a reason for taking it down and rebuilding it on a proper foundation, but not for destroying it.

The height is 70 metres (230 ft.); the thickness of the walls for the first two stages on the south (to which the tower leans) is 18 ft., on the north 12 ft.; the extra thickness of walling on the south was added in 1860. The central staircase, which has no newel, is 12 ft. across; above these two stages the staircase is built in

the thickness of the wall, the centre portion being carried up a closed well with 2-ft. walls, the external walls at this point being 5 ft. thick, diminishing to 3 ft. at the top. The octagon at the bottom is 42 ft. across, at the top 30 ft. (external dimensions).

The illustration is reproduced from a drawing by Mr. H. Rimmer.

THE ARCHITECTURAL ASSOCIATION: THE APPLICATION OF AN ARCHITECTURAL EDUCATION.

The second ordinary meeting of this Association for the present session was held on Friday evening, the 4th inst., in the meeting-room of the Royal Institute of British Architects. Mr. H. O. Cresswell, President, occupied the chair.

The minutes of the previous meeting having been read and confirmed, the following gentlemen (forty-eight in number) were elected members:—Messrs. F. S. Short, H. H. Skipper, Cyril Power, T. F. Green, G. H. Smith, G. P. Sheridan, W. H. Barrett, A. E. Gardner, F. E. Morris, A. H. Allan, S. P. Brinson, J. S. Lee, P. E. Stenning, E. G. Page, A. Stedman, A. F. J. Cox, C. A. J. Sharman, A. J. Gurney, T. E. Abbott, P. G. Radgrove, B. Hoole, J. H. W. Lake, R. S. Y. Fowler, A. G. Bewes, T. Wallis, F. Lishman, M. G. Peckell, P. Morris, W. H. May, G. O. Scorer, P. Sherrin, M. F. W. Bunney, A. B. Hayward, C. E. C. Shield, J. F. Wheeler, W. J. Waghorne, J. E. S. Perkins, Bishop, G. B. Hoole, C. G. Cruchy, S. Perkins, A. E. Dainton, A. W. Pocock, J. H. Coram, J. L. Walker, F. C. Simpson, E. O. Nisbet, and H. E. Y. Haggard.

Mr. William Young, F.R.I.B.A., then read a paper entitled "Notes on the Application of an Architectural Education." After some introductory remarks, he continued as follows:—

A few months ago I was present at a meeting of the Institute, and the discussion was very warm, and everybody in general disagreed with everybody else. At last, towards the close, Prof. Kerr got up and said, "I'll tell you a story." These words were like oil on troubled water, and for the first time that evening there was general agreement in listening to, and heartily appreciating, the Professor's story.

Now, Sir, if I may be allowed, I shall take a hint from the Professor, but with a difference. I shall begin my remarks on the subject by a story,—a little sketch from life,—in place of ending with one. Some years ago, when I was younger than most of you I see before me tonight, I found myself one of a band of young men engaged in the study of art; most of us were students of architecture, but we had one thing in common, we were all enthusiasts for art. We discussed art incessantly,—we agreed and disagreed about it. One thing is certain, just as iron sharpeneth iron we all derived benefit from our interchange of views amongst ourselves, we thought we could do something for the advancement of architecture. This, it was decided, was to take shape in a magazine devoted to the art side of architecture with nothing of the newspaper in it. This was at a time when the illustrations in the building papers were few, and had not reached the excellence they have attained to at the present day. Well, our scheme had so far advanced that we had a meeting with a well-known printer, to advise us as to the printing and publishing—our friend the printer, an amiable, kind old gentleman, with much experience at his trade, listened patiently to all we had to say, and at the end he replied, "Any one can write a book or a magazine,—and any fool can print it—but it takes a very clever man to sell it."

I do not quote this story to dissuade any of you from becoming authors and applying your architectural education in that way (it shows you the views printers and publishers take), for in spite of the wise advice several of us did blossom into authors. This little glimpse out of the past came into my mind when reading over your Curriculum for the present session. I was impressed with its comprehensiveness. I thought of the time just past when every architectural student had to work out his education in his own way, and I wondered how men like Wren and Inigo Jones acquired their architectural education, without even the aid of the splendid architectural libraries now at our service, and with very little instruction in drawing.

I may safely say there never was a time in

the minutes, &c., will keep them right. They will look to you to do so. If you do not get on with your committee, you will have a bad time, for then comes in the truth of the saying that "a committee has no soul to be saved."

Avoid making speeches in committee; the Committee look upon that as their prerogative. Say what you have to say in a few words. Be always in touch with the Chairman; he has usually a great influence over the other members, and is expected to know everything.

Do not take a committee by surprise. If you want anything important,—an extra 20,000, or so,—don't throw the request like a brick at their heads. Talk things over first with the Chairman and two or three others. You will find that most important business in committee is pretty well agreed upon before it comes formally before the meeting. If your committee take a wrong view of a matter, or are likely to divide in place of being unanimous, get the matter put off until another day,—what you want will then probably come all right. Committees have immense powers, and when they once come to a decision it is almost impossible to get them to alter it.

With committees, as with private individuals, you will find that with a little tact, and being always straightforward and open, and especially being yourself strong,—with sound reason and clear,—as to what you want to do, you will generally succeed in leading your client to do what he ought to do,—or, rather, to let you do what should be done. But if you are neglected yourself, have not fully made up your mind, if you are vacillating and uncertain, then depend upon it your client will often make you do things that he will be no credit to you and he no satisfaction to him, and they will blame you for it. And, by the way, let me add emphatically, if you want to manage them, never put on what is called "side." It is detestable under all circumstances, and would at once put a committee against you.

If you manage well, you will find that many a man whom you meet at first only as a client becomes your friend for life, and this management of clients is worth taking trouble over, if you consider that the main object of it is to enable you to do better work,—to save your design from being cut down and spoilt, and so far promoting the practical advancement of architecture. For remember this, one good work does not remain alone, but leads others to do good work.

It was said in this room, and it has been said elsewhere, that after all architects were the servants of the British public, and you will have to give them what they want. Well, I admit we are the servants of the British public, but we will best serve them by giving them what they ought to have and what is best for them.

Some of the British public have strong prejudices and fads; some have even brilliant ideas, which, alas! are impracticable; and if they come and give you a commission to carry out fads and impracticable notions, or schemes which you know to be wrong, and which, if carried out would be a disappointment to them and no credit to you, then, I say, the only true way to serve the British public is not to give them what they want, to oppose them, but to do something more; to show them where they are wrong, and even persuade them to do that which is right. This, in my opinion, is true service, and should be paid for double commission.

I have known instances where it took almost as much of one's time to keep a client from going wrong as it took to do the drawings of what was carried out.

I am not advising that you should take the high-handed course of opposing every suggestion that is given to you by your clients; on the contrary, I think the wise architect is not so conceited as to think no one has good ideas but himself; and he will take any suggestion, if there is any good in it, from whatever source it comes, and apply his skill to lick it into shape.

We are not an artistic nation, and the British public are not hungering and thirsting after art in building, but they will thank you afterwards for giving it to them, even although they may oppose the doing of it.*

MANCHESTER CREMATORIUM.—Messrs. J. & H. Pattison, of Manchester, ask us to state that they executed the mosaic flooring and the urn niches in the crematorium, illustrated in our issue of October 22.

* We will give the remainder of Mr. Young's paper, with some notes of the discussion, in our next.

ARCHITECTURAL SOCIETIES.

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—The opening paper of the present session of this Society was read on the 8th inst. by Mr. J. B. Mitchell-Withers, F.R.I.B.A., its subject being, "The Works of Sir Christopher Wren; with a few Notes on some of the Principal Domed Churches of Europe." The President, Mr. C. J. Innocent, occupied the chair, and there was a large attendance of members. The early history and education of the great architect was briefly sketched, after which the reader proceeded to deal with a few of his architectural works, commencing with the Chapel of Pembroke College, Cambridge, his earliest building; the Sheldonian Theatre, Oxford; the well-known Library in Neville's Court, at Cambridge, and other minor works. From the numerous churches erected in London, he selected the steeple of St. Mary-le-Bow, Cheapside, and the interior of St. Stephen's Wallbrook, giving in each case the criticisms of the principal writers on architecture, notably those of Elmes, Ferguson, Gwill, and Wightwick. The interior of St. Stephen's was considered by the reader to be Wren's most artistic work, fully justifying the remarks of Ferguson that it is the most pleasing interior of any Renaissance church which has yet been erected. The valuable paper contributed to the "Transactions of the Royal Institute of British Architects," by Mr. Penrose, which carefully investigates its study of harmonic proportions, was referred to. The steeple of St. Bride's, Fleet-street, with its harmonious interior, was described, and after a few remarks on the work at Greenwich and Hampton Court, the author proceeded to deal with Wren's greatest work, the Cathedral of St. Paul's, calling particular attention to those points which have been the subject of fierce discussion, i.e., the screen over the aisles, the wooden conical vaults in the dome, and the awkward arrangement of the arches supporting it. The remark in the "Parentalia" "that the idea of the cupola of St. Paul's was derived from the Pantheon at Rome" suggested to the reader the idea of comparing that building with the London example. The baptistry at Pisa was referred to as having a conical dome of a similar character to that of St. Paul's, after which the cathedral at Florence, some of the leading churches at Venice, together with the Church of the Invalides, and the Pantheon at Paris, were noticed, with several Roman examples. Particular attention was directed to the great Church of St. Peter's at Rome, and the points of difference between it and Wren's work were dwelt upon, as also the transformation of the church from the plan of a Greek cross to the Latin form by Carlo Maderno; the superiority of the former, as shown in Michelangelo's design, was illustrated by drawings by the late Professor Cockerell. Reference was made to the fact that Wren had never visited Italy, but must have had, by means of drawings, an intimate acquaintance with the works of some of the leading architects of the Renaissance school, and the writer considered that he had been much influenced in his work by his acquaintance with Bernini and his studies of that master's buildings. The lecture was illustrated with a number of lantern slides. On the motion of Mr. C. Hadfield, seconded by Mr. H. W. Lockwood, a vote of thanks was awarded to the lecturer.

LIVERPOOL ARCHITECTURAL SOCIETY.—This Society held its second meeting for the present (forty-fifth) session at the Royal Institution, Colquhoun-street, on the 7th inst., Mr. H. Hartley, vice-President, in the chair. After some preliminary business, Mr. T. Mellard Reade read a paper on "Questions of the Hour." He referred, among other things, to the probable influence of education on the jerry-builder, from whom came all the bad work of which they had to complain. His conclusion was that the jerry-builder did not want any technical education, and that it would not affect him until he was extinguished by a higher general level of intelligence which technical education might assist in bringing about. Referring to modern architectural ideas, of which he gave a brief historical résumé, Mr. Reade pointed out that there was now greater freedom than there was even in the time of the elder Pugin; but there was an increasing indisposition to employ architects to plan houses, the planning being done by speculative builders. Much of this was, perhaps, attributable to the tendency on the part of occupiers to remove frequently.

On the other hand, in regard to civic architecture, the architect had now more scope, and a great improvement was taking place in the design of public buildings and in the appearance and beauty of the streets. In conclusion, the reader of the paper referred to the question of heavy engineering works, and adverted upon the way in which the girders of the Liverpool Overhead Dock Railway spoiled the architectural view from the Pier-head. The company had devoted some extra thousands of pounds towards making this part of their line ornamental, with the result that the work might have been more ornamental if the money had not been spent.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The effects of this Association have, with the consent of the Board of Manufactures, and the approval of the Secretary for Scotland, been transferred to the Royal Institution, Princes-street, where in future the work of the Association will be conducted. The Association's meetings and work classes will in future be held on Wednesday evenings instead of Thursdays, as previously.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon last, at Spring-gardens, Mr. John Hinton, Chairman, presiding.

The Proposed New Street from Holborn to the Strand.—Mr. Frederic Harrison, Chairman of the Improvements Committee, brought up a joint report from the Improvements and Parliamentary Committee in reference to the proposed new street from Holborn to the Strand. The report was as follows:—

"In the report of the Parliamentary Committee presented to the Council on the 13th Oct., it was stated that the portions of the Council's reference as to the subject of this improvement, relating to the contribution by owners of ground values to the cost of the improvement, were reserved for a further report. The postponement of the report by the Council has afforded the Improvements and Parliamentary Committees the opportunity of fully considering the matter, together with other financial questions. We have had some difficulty in constraining the Council's reference with regard to the incidence of the cost, both in the case of this improvement and in that of the southern approach to the Tower Bridge. The resolution in the one part seems to mean that one-half of the net cost of the improvement is to be borne by the owners of property benefited by the improvements, at the same time leaving to the Committee discretion as to the amount of ratio to be fixed for the equitable division of the net cost of the improvement between the owners of ground values and the occupiers of property. We are advised that the enhanced values or special benefits conferred on property by the new streets will in no case amount to any sum approaching one-half the net cost of the street, and having regard to the fact that the Council has left it to us to recommend what shall be the equitable division of the net cost, we have construed the reference as meaning that half, not of the net cost, but of the enhanced values conferred by the new streets shall be borne by the owners of the properties so benefited. With regard to the equitable division of the net cost, we are of opinion that a moiety of the cost of the improvement should be paid out of a new rate to be imposed by Parliament on the metropolis as a 'Land Values Improvement Rate,' to be charged as in the nature of a land tax in respect of the ground values of property within the County of London, and to be charged upon the owners thereof, with provisions that the same is to be incapable of being made the subject of contract so as to shift the incidence thereof. We are advised by the Parliamentary agent that this charge cannot be imposed on ground values throughout the county by private Bill, but must rest on a public Bill, and that the Bill to be promoted by the Council relating to the street, might contain a provision that if any such Land Values Improvement Rate were imposed by any Act of the next session, a sum not exceeding an annuity to be calculated as hereafter mentioned and for a period of sixty years might be charged upon and raised out of any such 'Land Values Improvement Rate' in respect of the cost of the proposed street and scheme; such annuity to be calculated and to be equal on the 3½ per cent. tables, payable half-yearly for a term of sixty years, to a sum of 1,123,000*l.*, being the estimated moiety of the net cost of the street; if this annuity were charged upon the 'Land Values Improvement Rate,' such rate would have to be, according to the estimate of the officers of the Council, at least one penny and a fifth in the *l.* on the estimated ground values of the metropolis.

The following are the recommendations which we have to make:—

(a) That, if instead of acquiring any property within the limits of deviation the Council shall leave

the same in the owner's possession, such property shall contribute (to be secured by way of charge) 50 per cent. of the enhanced value or special benefits conferred upon it and consequent on the carrying out of the scheme as authorised, such value to be ascertained by an arbitrator, with power for the owner to redeem such charge.

(2) That, as to the Strand Bill of 1890, a provision should be inserted that improvements made after July 22, 1892, when the scheme was made public, shall not be taken into account in assessing compensation.

(3) That a moiety of the cost of the improvement be paid out of any new rate to be imposed by Parliament on the metropolis as a "Land Values Improvement Rate," to be charged as in the nature of a land tax in respect of the ground values of property within the County of London, and to be charged upon the owners thereof, with provisions that the same shall be incapable of being made the subject of contract so as to shift the incidence thereof, and that a communication be made to the Local Government Board with a view to the introduction by the Government of a Bill dealing with the subject in the ensuing session."

On the motion that recommendation "a" be adopted.

Mr. Boninot, M.P., moved the following amendment:—

"That it is desirable to formulate a scheme which, while fully upholding the principle of the inviolability of contracts, shall, both the owners and occupiers of house property in London shall directly contribute to metropolitan improvements."

Mr. Urquhart seconded the amendment, which, after discussion, was lost on a division by 75 votes against 28.

Recommendations *a* and *b* were then agreed to.

It was agreed, by consent of Mr. Frederic Harrison, the mover of the motion for the adoption of the report, to leave out the following words in recommendation *c*: "on the metropolis as a 'Land Values Improvement Rate,' to be charged as in the nature of a land tax."

On the motion to adopt recommendation *c* as thus amended,

Mr. Campbell moved, as an amendment,

"That till some means of the Council's obtaining money, in place of the former Coal Dues, and in addition to levy by rate, to carry out permanent improvements has been afforded, the Council considers that the Council's rate should, subject to existing contracts, be divided equally between owners and occupiers as suggested by the Select Committee of the House of Commons on Town Holdings, but that it would be only fair that previously to such division taking effect the County Council franchise should be conferred on owners of ground values; and that the Local Government Board be asked to at once promote a Bill to the above effect."

Mr. Reed seconded the amendment, which was defeated on a show of hands.

Mr. Antrobus moved and Mr. Westacott seconded the following amendment:—

"That, whilst admitting that ground values should bear a fair share of the cost of permanent improvements, and apart from the claim of existing contracts to protection inasmuch as ground values do at present contribute materially to existing rates, the Council cannot accept the proposed imposition of a moiety of the cost of the intended improvements upon such ground values as an equitable division of the net cost, and refers the recommendation back to the Committees for reconsideration."

The amendment was defeated by a considerable majority.

Mr. Beachcroft next moved this amendment:—

"That a moiety of the cost of the improvement be paid out of any new tax or duty, which may be imposed by Parliament on the owners of reversionary interests within the limits of the county; and that it be referred to the Local Government and Taxation Committee to formulate a definite proposal on the subject for the consideration of the Council with a view to the same being submitted to the Government."

This amendment was lost.

The Duke of Norfolk moved that the following words should be added to the recommendation:—

"And that such communication be submitted to the Council before being sent to the Local Government Board."

On a division the amendment was defeated by 62 votes to 40.

Mr. Costelloe moved to add to the recommendation:

"That notwithstanding anything contained in the resolution of the Council, the Parliamentary Committee be empowered to embody in a separate Bill provisions for creating an improvement rate or charge by means of property and out of such charge provision shall be made for the payment of one moiety of the cost of the improvement, and that the necessary notices be issued."

This amendment was carried by 61 votes to 35.

The Rev. Fleming Williams moved to omit the word "improvement" where it first occurred in the addendum.

This was defeated; and the recommendation,

as amended by Mr. Costelloe, was then agreed to.

Resignation of a District Surveyor.—The first paragraph of the Report of the Building Act Committee was as follows:—

"We have to report that Mr. Charles Fowler has resigned the position of District Surveyor for the District of Shorelitch and Norton Palgates. We propose in due course to take the necessary measures for filling the vacancy, and to submit to the Council the name of the person whom we may consider the most suitable for the appointment. We now recommend,—

"That Mr. Fowler's resignation be accepted as from November 7, 1892, and that Mr. H. Lovegrove be appointed as *interim* District Surveyor for the District from that date until the vacancy shall have been filled up by the Council."

This was agreed to, and after transacting other business, the Council adjourned shortly after seven o'clock.

COMPETITIONS.

BAPTIST CHAPEL, BLACKBURN.—It was recently decided to erect a new Baptist chapel and school in Blackburn. Invitations were sent to the following architects to submit designs:—Messrs. Morley & Woodhouse, of Bradford; Mr. Baines, of London; Messrs. Stones & Gradwell, Messrs. Simpson & Duckworth, both of Blackburn; and Messrs. Briggs & Wolstenholme, of Liverpool and Blackburn, all of whom complied with the invitation. The Committee, we are informed, have selected the design submitted by Messrs. Briggs & Wolstenholme, and building operations will be commenced without delay. The chapel will be situated at the corner of Granville-road and Leanington-street, and will accommodate 700 worshippers, and will be constructed of brick, with stone dressings. It is in the Romanesque style of architecture. The cost, including the school building, will be over 5,000*l*.

BUILDERS' BENEVOLENT INSTITUTION: ANNUAL DINNER.

The forty-fifth anniversary dinner in aid of the funds of this institution was held on Thursday, the 3rd inst., at Carpenters' Hall, London Wall. Mr. Joseph Randall, the President of the Institution, occupied the chair, and was supported by Mr. George Plucknett, J.P. (Treasurer of the Institution), Mr. B. J. Jacob (Master of the Carpenters' Company), Major Isaac, Mr. W. R. Freeman, Mr. T. F. Rider, Mr. W. Shepherd, Mr. Higgs, Mr. C. Bessell, Mr. T. Stirling, Mr. Bolding, Mr. Hall, Mr. George Burt, jun., Mr. C. A. Sussell, Mr. Northcroft, and other friends of the Institution, the company numbering about 130.

The Chairman gave the toast of "Her Majesty the Queen, the Princess and Princess of Wales, and the rest of the Royal Family," and Mr. T. Hill proposed "The Army, Navy, and Auxiliary Forces," which was responded to by Major Isaac.

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," expressed regret at the absence of Major Brenton (the Secretary), through illness, and reminded his hearers that the charity was founded in 1847 to give relief and grant pensions to necessitous masters in the building trade and its branches. Since that date no fewer than 252 pensioners had been on the funds of the charity. At present, 54 pensioners were in receipt of relief, viz., 19 men and 35 women, whose average age was 74 years. To maintain so many pensioners, liberal donations were necessary, especially as the annual subscriptions had somewhat fallen off. The men received 3*l*., and the women 2*l*7*s*., yearly, so that the annuities amounted to about 1,700*l*. per annum. The reason why the female pensioners were so numerous as compared with the men was that the widows of pensioners had been admitted on the death of their husbands, and the income last year from all sources was 2,052*l*., and the expenditure 2,070*l*.. The Institution had about 700 donors and subscribers,—a number which could and should be largely increased. Many of the pensioners had once been in good and even affluent circumstances, but from causes which they had been unable to control they had been reduced to poverty, with no other resources left them but the benefits conferred by this Institution. It would, therefore, be a great hardship to curtail the annuities of present pensioners for want of funds, or to postpone the election of the five approved candidates, who were in straitened circumstances, and were eagerly looking forward to early election. To those who were as fully acquainted as his hearers were with the vicissitudes of the building trade, and who were aware of the precarious nature of a builder's business and the many risks with which he had to contend, it was not surprising to find so many applicants for assistance. Indeed, the In-

stitution had many more applicants than it could ever hope to support, but that should be an incentive to further effort to increase the funds. could not help thinking that to reduce the pensions of the aged people now supported by the Institution would be a disgrace to the building trades generally, and to the trades connected with it. The Chairman concluded his appeal by coupling with the toast the name of Mr. George Plucknett, J.P., the Treasurer.

The toast having been duly honoured, Mr. Plucknett replied on behalf of the Institution, and thanked the President for his anxiety to maintain the charity at its present level.

Mr. T. F. Rider, in a humorous speech, gave "The Worshipful Company of Carpenters," referring to their efforts in aid of technical education and to their hospitality and benevolence.

Mr. B. J. Jacob (Master of the Company) replied and expressed the pleasure the Company had in aiding the Institution.

Mr. Freeman proposed "The President," referring to the many important works carried out by Mr. Randall, and his readiness to assist in an charitable object.

The toast was received with acclamation, and the Chairman made a suitable reply.

Mr. Shepherd gave "The Architects and Surveyors," adding that so long as good feeling could be preserved between the architects and the builders, so much the better would it be for both to depend upon the quality of surveyors, who were thoroughly honest and painstaking body of men.

Mr. Tahherer, who responded, said he appreciated the remarks as to the sympathy which ought to exist between the architect and the builder.

Mr. Neighbour also replied on behalf of the surveyors.

The remaining toast, viz., that of "The Vice-President, Committee, and Stewards," was heartily received.

In the course of the evening subscriptions amounting to the amount of 492*l*. were announced of which sum 400*l*. appeared on the President's list.

Correspondence.

To the Editor of THE BUILDER.

ARCHITECTURE: A PROFESSION OR AN ART.

SIR,—While thanking Mr. Cole Adams for his appreciation of the motives of the essayists whose work he reviews, I regret that we have failed to make our motives and objects clear to him. His letter raises questions which we hoped we had anticipated and answered.

Construction, he says, is a science. In this we entirely differ from him. "Statics and Dynamics," we say, "are Sciences, but Construction is an Art, and when conjoined with Design, a Fine Art,—in fact Architecture." Being, then, an art, architectural construction, or, in other words, architecture, cannot be learned from text-books, or crammed up for examinations, but can only be acquired by actual practice and experiment.

But when Mr. Adams argues that examination in art is not impossible because men compete for prizes and for employment, he is really railing the traditional red-herring across our path, and we must refuse to follow him. Competition for a prize is one thing; nobody denies that one can choose the best design and premise it. But it is a very different thing to decide by examination whether a man is to be allowed to get his bread in a particular way or not.

This brings us to the well-worn fallacy of the professions. As the test of examination is applied to Orders, the Army, the Navy, and the Law, why should it not be applied also to Architecture? But as we have many times tried to point out, there is no analogy between the cases, and Mr. Adams might as well go on to ask "Why not examine for painting, sculpture, literature, the drama, the concert-room, or the Senate?" Public approval or condemnation is the only criterion of fitness in these cases, and so, we submit, must it be with architecture. In the case of Physic Mr. Adams's own analogy fails him, for who would certify a doctor who had not walked the hospitals and worked in the dissecting-room, whereas the Institute will certify as an efficient architect a man who has read about bricklaying in books, but never really seen one brick laid upon another?

We are next accused of being hard on the architect who also practises surveying. Mr. Adams, like Mr. Nevill, assumes that we want to restrain architects from practising as surveyors, and to dictate to them what they

shall or shall not do. Pray let it be understood that we neither wish to dictate to anybody, nor do we propose to prevent any man being a surveyor who pleases. It is not we who are clamouring for bolts and bars and small watercoats or for restrictive Acts of Parliament and close tests for admission. We are glad that every man should enjoy the same liberty of practising architecture, if he can get employment, which we claim for ourselves.

All we say is that if you want to be a good architect you must give all your thoughts and working hours to it, or otherwise you will at best be only a tolerable amateur. This is not our fault. We simply state a fact which experience confirms every day. It is not we who are hard on the surveyor-architect, but the tyranny of fact, which he would do well to recognise. If it is true, as Mr. Adams says, that most country architects must also do surveying in order to live, then it follows that most country architects are condemned by fate to turn out bad, or at best poor stuff as architecture. This is no fault of ours, and if Mr. Adams is right, we can only regret that the outlook is so unpromising for architecture in the rural districts.

Finally, we are accused of hostility to the Royal Institute of British Architects, and our book is supposed to be an attack on that body. I for one desire to disclaim all feeling of hostility to that or any other society. The object of our attack is "Professionalism," the professional ideal of the modern architect, and the Institute only comes within our range because it does certainly at this moment form the keystone of the professional system.

The professional system has been tried. Those who think it a success are quite right to go on with it. The Institute, I suppose, thinks so, because it is screwing up the professional ideal higher and higher. Those who are satisfied with the average standard reached by the architecture of the day, and wish for nothing better, may go on as they are. To those who think we may do better if we are only left free to do it, we hope our volume of essays may bring some welcome suggestions of a better way.

THOS. G. JACKSON.

The Student's Column.

CONCRETE.—XX.
TEMPERATURE, ETC.

THE state of the atmosphere has a very great influence on the hardening of hydraulic limes and cements. The scorching heat of summer is almost as injurious as the biting cold of winter. The former is dangerous, because it abstracts the water which is necessary for the proper crystallisation of the lime; the latter, because it freezes the water, causing it, therefore, to swell and crack the mortar, so that sometimes it becomes little better than so much sand. Moist heat hastens the setting of cement, and also its hardening; it is dry heat which is injurious. Only a few months ago a gentleman thought the Portland cement, which was being used in the walls of his house, was of inferior quality; he made a pat of it, and found that it set properly and attained considerable hardness in a few hours, but in a day or two became quite easily friable. The cause was not hard to seek. He had kept the pat on a mantel-shelf immediately over a good fire. The writer, to set his mind at rest, made pats of the cement neat and with sand, allowed some to harden in air (not near a fire) and some in water, and found the cement absolutely sound, and of gradually increasing strength. And yet it is not very many years since a correspondent in *The Engineer* advocated the lighting of fires every evening at the feet of mill chimneys in order to set the mortar which had been laid that day. Heat will dry mortar, but that is a very different thing from causing it to set. Rapid drying is injurious. The rapid drying of floors and roofs may be prevented by covering the concrete for a week or more with a shallow pool of water renewed when necessary, or with a layer of sawdust or sand kept continually moist, or with straw, sacks, &c., which protect the concrete from the direct action of the sun and wind.

Portland cement stucco is seldom sound when executed in hot summer weather, unless great care has been taken in wetting the concrete or brickwork before applying the stucco; pro-

tecting the wall as far as possible from the direct action of the sun is also a useful precaution. Warm, damp weather is most suitable for the setting of cement, whether in stucco or concrete, but damp weather, even somewhat cold, is better than extremes either of heat or frost. Variation of temperature is also to be avoided as much as possible. It frequently happens that concrete is exposed to the heat of the sun by day and to keen frost by night, and this is almost sure to cause cracks in the work. Covering the concrete with straw and sacks will afford some protection, but in many cases it will be best to stop the work until the weather is more suitable.

Frost frequently does great harm to concrete, although laboratory experiments seem to show that it does little harm to cement briquettes. A keen frost also prevents all concrete work, by freezing the water of mixture. Various expedients have been tried for the purpose of allowing concrete to be made and deposited during frost, and also of rendering newly-deposited concrete proof against a sudden attack of frost. The object is attained by adding to the water something to lower its freezing-point. The least harmful of such substances is, as far as is known, common salt. We have seen in Chapter XIII. that sea-water, which contains salts of various kinds, has little or no weakening effect on cement, and operations can be carried on with sea-water on many days when fresh water would be frozen. Professor Ira O. Baker, in his "Masonry Construction," gives the following rule:—"Dissolve 1 lb. of salt in 18 gallons of water when the temperature is at 32 deg. [Fahrenheit], and add 1 oz. of salt for every degree below freezing-point." We may add that the freezing point of water to which 25 per cent. of salt by weight has been added is 7 deg. F., while that of water containing 33 per cent. is 4 deg. F.

Sugar has been ardently recommended by some persons, and undoubtedly it does lower the freezing-point of water so that mortar can be mixed in four or five degrees of frost. It also actually increases the strength of fat lime mortar to a considerable extent, and is said to improve that of some hydraulic limes and natural cements, but on Portland cement it acts disastrously. In Portland cement concrete it must therefore never be used.

Soda has sometimes been added to concrete to render it frost-resisting, but there is considerable doubt as to the success of the operation.

On the whole, salt seems the only substance which is at all successful, and it will be wiser not to resort to the use of this except in cases of urgency. Operations should be suspended, when possible, until the weather is more favourable.

Warm water causes cement to set more quickly than cold, but it cannot be recommended as a preventative of the ill effects of frost, as the heat is soon lost, and although the concrete may by its aid be properly mixed, the probability is that the frost will have the mastery before it is properly set.

Expansion and Contraction.—The expansion of concrete in hot weather and its contraction in cold weather are now well-known facts, and ought to be guarded against. In their designs for bridges, &c., engineers are compelled to consider carefully the expansion and contraction of iron and steel under changes of temperature, and it is little hardship for us to have to take into consideration the variation of concrete, which is probably only about one-third that of iron. Ignorance, however, of the facts has led to the destruction or disfigurement of much concrete paving, walling, &c. At one time it was thought that cement expanded largely in setting, and that this was the cause of many cracks in concrete. Undoubtedly, had cement may expand or contract in setting, but in Chapter XII. we showed that the expansion of good air-slaked Portland cement is almost inappreciable. The cracks in concrete walls and paving are most commonly due to changes of temperature, the cracks having a tendency to open in winter and close in summer; for this reason Mr. Thomas Potter prefers laying concrete paving in winter and protecting it with straw, sacks, or other covering, as by this means he considers that the concrete is laid at the time of its greatest contraction, and that any change of temperature simply causes it to expand and compress itself to a greater density. This, at any rate, is ingenious.

In continuous concrete walls, paving, &c. of considerable length, subject to the full effects

of the year's changing temperature, cracks frequently occur at moderately-regular intervals. In retaining walls and paving, the cracks are objectionable, mainly because they are unsightly, but in flat roofs, &c., the cracks are a source of danger and give ready entrance to unwelcome rain. The usual method of preventing these cracks is to lay the concrete in more or less distinct masses of moderate size. In the case of retaining walls, a thin strip of wood or plate-iron 3 in. or 4 in. wide, is introduced edgewise into the face-concrete every 20 ft. or 30 ft., and is withdrawn before the concrete has properly set; this forms a kind of joint, which may be afterwards filled with mortar. Paving may be separated into slabs about 10 ft. long in the same way. In the case of large flat roofs resting on iron girders, a strip of wood about 2 in. thick can be placed along the centre of each girder; the strip may extend the full thickness of the roof and will form a guide for the workmen in depositing the concrete. When the concrete has set sufficiently, the wood can be picked out to the depth of 1 in. and the joint filled with mortar or, better, with asphalt; the whole roof can then be finished with asphalt. In the case of large concrete tanks (say, more than 15 ft. long) the concrete should be protected as much as possible from changes of temperature by forming them underground or by filling around them with earth; under such circumstances no fear of cracks from contraction need be feared.

Porosity.—Water-tight concrete is sometimes required, as for the bottoms and sides of tanks, flat roofs, and the ground-layer under a building. It may be said at once that all concrete is not by any means water-tight; the porosity may be due to the nature of the aggregate, as in the case of coke-brace, soft bricks, friable stone, &c., or may be caused by the bad proportion of the ingredients, which allows voids in the concrete, or may be due to insufficient ramming. The use of too little water in mixing makes concrete less dense than it ought to be. Almost all concrete will allow the percolation of water under pressure, but Mr. Falja found that the forced percolation of water through cement-mortar (1 to 3) improved rather than injured its strength, and that the pores in the mortar gradually filled up, so that at the end of about three months the water ceased to pass through it.* Mr. Cash† found that, when water with a head of 20 ft. was applied to a plug of concrete 12 in. thick, composed of Portland cement, coarse sand, and gravel (1 + 2 + 5), no less than 165 ozs. passed through in the first twenty-four hours, while only 5 ozs. passed through a 12-inch plug made of similar materials in the proportion of 1, 2, and 7, but rendered with cement-mortar (1 to 3), "trawelled on as thinly as possible." On the fifty-fourth day 42 ozs. passed through the former, and 4 through the latter. This shows the great advantage of rendering concrete with cement or cement-mortar, or, in the case of ground-layers and roofs, with asphalt.

Professor Tichborne, F.I.C.,‡ found the relative porosity of certain mortars and cements to be as follows:—1. Common lime-mortar (1 to 2), 100; 2. Plaster of Paris, 75; 3. Roman cement, 25; 4. Portland cement, 10. Asphalt is, he considers, a perfect septum.

Concrete intended to be watertight should be rich in cement, should have sufficient sand (coarse and fine), and sufficient water, and should be well rammed. One part cement, plus two parts sand, plus two or three parts screened aggregate of various sizes, up to about 1½ in., well mixed and rammed, should result in a sufficiently impervious concrete, but a coat of stucco applied to the face of it would be advantageous.

Weight.—The weight of concrete is sometimes important; in the case of floors, for instance, lightness is a point which ought to be specially considered in connexion with the strength. In external walls there can, as a rule, be no objection to heavy concrete, but in internal partition-walls, especially on upper floors, lightness is an advantage. The results of tests by Mr. Grant on the weights of the various concretes mentioned in Table XX., (p. 306, ante), are in Table XXII. (next page).

We learn from this table that compression increased the weight of the blocks about 4 per cent., while, as we have already shown, it increased the strength about 27 per cent. The difference in weight between the 6 to 1 and 10

* "Society of Engineers," 1889.
† "Inst. C.E.," vol. CVII., 1891-2, pt. I.
‡ Paper read at Sanitary Congress, Worcester, 1889.

TABLE XXII.

Weight of Portland Cement Concrete in lbs. per cubic foot (see previous page).

No.	Aggregate.	Six to One.		Eight to One.		Ten to One.		Ratios of	
		Com- pressed.	Not Com- pressed.	Com- pressed.	Not Com- pressed.	Com- pressed.	Not Com- pressed.	Weight.	Strength.
1	Ballast	143.2	138.8	142.8	139	141.4	137.6	99	49.1
2	Portland Stone	135.2	125.6	130.5	125	131.5	129.2	91.3	100
3	Granite	148.2	139.2	144.8	139.6	139.2	135.7	99.4	68.6
4	Pottery	128.8	126.8	129.2	125.6	128.7	125.2	89.8	74.4
5	Slag	120.6	118.4	113.6	109.8	112	110	80.4	56.4
6	Flints	132	121.6	131.6	123.2	129.2	121	89.1	56.3
7	Glass	148	142	144	138.4	143.2	135.6	100	53.3

to 1 concretes is only about 3 per cent, the latter being the lighter on account of the greater amount of voids in it. The last two columns are interesting; they show that ballast and glass make very heavy but very weak concrete, that slag makes moderately light and very weak, and that Portland stone and pottery make concrete heavy but strong, Portland stone giving the greatest strength of all.

The weight of concrete varies also according to the amount of sand it contains; a concrete having too little sand will be more porous, and, consequently, lighter than one containing more sand, other things being equal. Again, the weight of different kinds of the same class of aggregates varies largely; e.g., different sandstones vary in weight from about 116 lbs. to 170 lbs. per cubic ft., and the weight of the concrete made with them will vary in the same proportion.

For these reasons, it is impossible to give a table of weights of concrete which shall be of much value. It may, however, be said that coke-breeze concrete will weigh from 70 to 80 lbs. per cubic foot; burnt-clay concrete about 100 or 115 lbs.; brick concrete about 120 lbs.; gravel or shingle concrete about 120 to 145 lbs.; and granite concrete from 135 to 160 lbs. Concrete made with broken limestone or sandstone will vary from 110 to 150 lbs., according to the weight of the stone.

OBITUARY.

MR. J. W. WILD.—We regret to hear of the death, on the 7th inst., at 13, Lincoln's Inn-fields, of Mr. James William Wild, Curator of the Soane Museum. From information communicated to us by his family, we learn that he was born on March 9, 1814, and was consequently in his seventy-ninth year. He was the son of Charles Wild, a well-known artist in his time, a Member of the old Water-Colour Society, and author of "Wild's Cathedrals." In early life he inclined to Gothic art, his friends regarding St. Saviour's Church, Southampton, as his best example. He joined Dr. Lepsius's expedition to the East, sent by the King of Prussia in 1842, and discovered the construction of the Great Pyramid. He lived several years in Damascus and Cairo, and studied deeply the mosques and domestic architecture of the Arabs, on which he was considered a good authority. In his investigations he adopted the native dress, in order to penetrate the mosques, and he has left behind a great many beautiful sketches of details. Inspired by Byzantine art, he built St. Mark's Church, Alexandria, St. Martin's Schools, Endell-street, and Christ Church, Streatham. He was connected for several years with South Kensington Museum as referee concerning Arabian art. While there, the British Legation at Teheran and the Bethnal Green Museum were built from his designs. For the last fourteen years he was Curator of the Soane Museum, Lincoln's Inn-fields. During the last three years of his curatorship, the present Trustees undertook the enlargement of the Museum, which has been carried out under the direction and from the designs of Mr. Wild.

MR. H. J. MARTEN, M. INST. C.E.—The death is announced, as having taken place on the 3rd inst., at his residence, "The Birebos," Codsall, Wolverhampton, of Mr. Henry John Marten, M. Inst. C.E., in his 60th year. He had lately given evidence (published in our pages) before the Royal Commission on Metropolitan Water Supply, as to a scheme of nine storage reservoirs, proposed by him in conjunction with Mr. Role.

THE WIDENING OF LUDGATE HILL.—The progress of this improvement, begun twenty years ago at the southern end, has been described from time to time in our columns. The project is now practically completed by the recent demolition of one of the houses by the corner of St. Paul's churchyard, and a recommendation by the City Sewers Commission to pay 20,000*l.* to Messrs. John Howell & Co. for their interest in some property there.

GENERAL BUILDING NEWS.

MUNICIPAL BUILDINGS, BATTERSEA.—The foundation-stone of the Battersea Municipal Buildings and Town Hall, situated in Lavender-hill, was laid on the 7th inst. by Mr. Edward Wood. The architect is Mr. E. W. Mountford, and the builder Mr. W. Wallis, of Baltham. The buildings will cost over 25,000*l.* The materials employed are red Suffolk bricks and Monk's Park (Bath) stone for the walls, the roofs being intended to be covered with thick green Westmoreland slates. The frontage to Lavender-hill is 110 ft., the principal entrance being in the centre. The entrance hall measures 54 ft. by 30 ft. and round it are grouped offices for the transaction of the business of the Vestry and board of churchwardens and overseers. The grand staircase to the first floor springs from the entrance hall facing the vestibule, and will have balusters of pink Devonshire spar, the plinths and hand-rails being of polished Devonshire marble. The council chamber, which will occupy the front central position of the first floor, will be 54 ft. by 35 ft., and will have a committee-room at each end. A large gallery is to be provided in the council-chamber for the accommodation of the public, which will be approached by a separate staircase from the new street on the eastern side of the buildings (Town Hall-road) and by a corridor on the second floor. This large public hall is to be in the rear, with a separate grand entrance from the Town Hall-road, and will have other entrances also from this road and from the footway, which extends along the whole of the western side of the buildings. This hall will be 117 ft. in length by 55 ft. in width, and will seat 1,200 persons. Beneath the large hall there will be a smaller hall measuring 55 ft. by 38 ft., and in connexion with both halls the necessary reception, cloak, and retiring-rooms will be provided. The contractors for the constructional ironwork (cast and wrought) have been Messrs. W. H. Lindsay, New, & Co. Elevations and ground floor plan of the building appeared in the *Builder* for December 19, 1891; and a view of the principal staircase in the *Builder* for July 9, 1892.

A NEW "PALACE OF VARIETIES" AT EDINBURGH.—On Monday last a new theatre was inaugurated in Edinburgh, under the designation of "The Edinburgh Empire Palace, Limited." It occupies a situation between Nicholson-street and Potter-row, where formerly stood a circus, which was destroyed by fire. The principal entrance is from Nicholson-street, between two rows of shops, and the body of the building does not, therefore, lend itself to external architectural effect, but over the entrance there is a tower which calls attention to the existence of the building in the rear. The entrance hall is of highly ornate character, and leads to a marble staircase, upon which has been lavished a profusion of ornament. It is carried up to a large landing with two separate flights, between which is a grotto with water falling over rocks into a large basin, with palms and ferns interspersed. Over this there is a ceiling painted to represent the sky, with birds and starlike electric lights. Entrance to the principal parts of the house is obtained from this landing, and to the gallery from Potter-row in the rear. The centre of the ceiling is taken up by a dome, with enrichments, under which is an octagonal room, with a glass roof, under which can be removed in a few minutes, and disposed of to the enriched ceiling. The stage, which is 75 ft. by 40 ft. in depth, can be removed in a few hours, and transformed into a circus, while the ordinary movement of the sides of the proscenium. The building, from the designs of Mr. Frank Matcham, of London, is of fireproof construction. A fireproof curtain divides the stage from the auditorium, and all promenades, passages, and staircases are wide, and constructed of concrete and iron, and each part of the house is furnished with hydrants and other means of extinguishing fire. The following local and other firms have been engaged in the construction and fitting up of the new building:—Contractors, Messrs. Drysdale & Gilmore, Edinburgh; Fibrous Plaster Work, The Carter & Piere Co., London; Painting Decorations, Messrs. J. Binn & Sons, Halifax; Gas Fitters, Messrs. Robertson & Cairns, Edinburgh, and Mr. Tolleront, Leeds; Electric Lighting, Edison Swan Co., Limited, Manchester; Sliding Roof and Special Iron Construction, by Messrs. Whitford & Co., London; Marble

Columns, Floors, &c., by Messrs. Gunn & Edinburgh, and Messrs. Bellman, Ivey, & Co., London; Hydrants and Plumbers, Messrs. J. & Sons, Edinburgh; Hot Water Heating, Messrs. Crumblin & Sons, Bolton; Upholstery, Messrs. Curtains, Mr. A. R. Dean, Birmingham; Colours, Messrs. Paterson, Smith, & Co., Edinburgh; Tip-up Chairs, Messrs. Crausell, Edinburgh; Fireproof Curtain, Messrs. Staines, Limited, Ulverston; Drop Seene, Frampton, Sunderland; Cascade Rockery, Floral Decorations, Messrs. Dickie & Co., Edinburgh.

VENNAL CHURCH, EDINBURGH.—We understand that extensive structural alterations are to be made to the Old Vennal Church, Edinburgh. The work has been placed in the hands of J. Williams Dunford, architect, of London.

THE EXTENSION OF ABERDEEN UNIVERSITY BUILDINGS.—The plan of building extension adopted by the University Court is, says the *Scotsman*, estimated to cost about 30,000*l.* It comprises the extension and completion of the range at Marischal College by the extension of north wing to accommodate the department of chemistry, pathology, surgery, medicine, and the erection of a new front block facing Brindley street, accommodating the administrative offices of the University, court-room, faculty-room, committee-room, secretaries' rooms, and lady students' rooms, also the departments of botany, agriculture; and the erection of a new graduation hall and students' rooms in the rear of present buildings, and connected with the existing hall and library and museum; likewise of the arrangement and addition to the department of anatomy. The plan also provides for the erection at King's College of a new natural philosophy department and for students' rooms, including accommodation for ladies. The external appearance of the Marischal College buildings very resemble the original design, the only change in the plan being that the hall is placed at the bottom in connexion with the existing halls instead of at the top of the block, which is now to be devoted to administrative offices, library, and agriculture. The architect is Mr. Mackenzie, of Messrs. Matthews & Mackenzie, Aberdeen.

NEW BANK PREMISES, LIVERPOOL.—The new head offices of the Adolphus Bank, Liverpool, at the corner of Castles-street and Brunswick-street, were recently opened for business. The buildings designed by Mr. W. D. Caris, of London, shows a fresh treatment of the early sixteenth-century style of architecture. The vertical pilasters, says the *Liverpool Post*, are in five instances terminated in figures, representing Peace, Plenty, Prudence, Justice, and Fortitude, these figures and the figures serving to carry up the vertical treatment through the second floor, when it gives way to a fresh motive in the third floor story, which really surmounts the main cornice. Advantage has been taken of the corner site to secure an entrance door at the angle. The bronze doors are from the designs of the architect, and have been executed by Messrs. Starkie Gardner & Co., of Lambeth. The figures and plaques are due to Mr. Stirling Lee, the sculptor. A wood-grained vestibule leads to the banking hall proper, which is lofty and well-lighted. The walls are panelled in marble of several quiet tones, which give a rich and ivory predominant effect. The fittings are in English oak. The ceiling was modelled by Messrs. George Jackson & Son. A billiard lift leads to the basements, which are glazed bricks throughout, and fitted with burglar-proof appliances by Messrs. Chubb & Sons. The main staircase to the general offices has been designed so as not to confine the space in the banking-hall or to break into the general area. It is relieved by a passenger-lift which serves the upper floors. The bank board-room is in neposited oak. The building work was executed by Messrs. Roberts & Robinson; the marble work and decorative carving by Messrs. Norbury & Patterson; the English oak fittings by Mr. Dart, of Crediton; the gilding and decorative painting by Messrs. Halpeney & Co.; and the electric light fittings (also from the architect's design) by Messrs. Cox & Buckley, per Mr. R. Rathbone.

NEW WORKSHOP FOR THE BLIND OF KENT, LONDON-STREET, GREENWICH.—This building has been erected from plans of Mr. F. Harris, architect, by Mr. J. F. Collins, builder, of Toddington. The cost has been defrayed from a fund left by the late Mr. Nasmith (inventor of the steam-hammer), and the workshop will be a great boon to the blind, as it will enable them to earn their own living at suitable trades which they have been taught. The building is in a prominent position in the main thoroughfare; the front is built of red brick, with Portland stone dressings. The ground-floor windows have mahogany sashes and plate glass, to be used as show-windows to exhibit the wares made by the blind. The whole of the building will be used as workshops, where baskets, mats, and other useful articles will be made. It is warmed by Grandif's hot-air apparatus.

NEW CHANCEL, ST. PAUL'S EPISCOPAL CHURCH, EDINBURGH.—On the 14th ult. St. Paul's Episcopal Church, York place, Edinburgh, was re-opened by the Bishop of Edinburgh after undergoing alterations, including the erection of a new chancel. The

church as originally designed consisted of a nave, north and south aisles, and a short chancel 15 ft. long. The nave consisted of five bays of a total length of 73 ft., with a gallery over the entrance at the west end, in which was placed the organ. The galleries were continued over the aisles, with access by a passage flanking the main entrance at the west end. In designing the new chancel, the original east termination of the church has been preserved, merely extending it by the distance required for a chancel in keeping with the length and other proportions of the nave. As it was decided at the same time to remove the galleries, the space formerly occupied by them has been added to the nave, which is now one bay longer than before. The new chancel is equal in length to three bays of the nave, about 50 ft., and the organ is now placed in a bay next the nave, with stone piers and arches opening to the chancel and the south aisle. Beyond the space occupied by the organ is the clergy vestry, and below it is the choir vestry. In the chancel there is a choir room, and off it are the organ bellows and hydraulic engine. The church has been re-seated, and oak choir and clergy stalls have been placed in the chancel. The glass of the original east window has been transferred to the west window, and the east window and south aisle windows have been fitted with stained glass by Messrs. Heaton, Butler, & Bayne. The internal length of the church from the west to the east wall is now over 140 ft. The architects were Messrs. Kinnear & Poddie, of Edinburgh.

ADDITIONS TO ST. JOHN'S CHURCH, KIDDERMINSTER.—On the 22nd ult. the foundation-stone of the new nave and chancel of St. John's Church, Kidderminster, was laid by the Countess of Dudley. The present church was built about fifty years ago, and although the fabric, which is of blue bricks, had received attention from time to time, it is now in a serious state of disrepair, and it has been decided to practically erect a new building. On the north side of the present building (which consists of nave and transepts, with galleries and small spire) it is proposed to erect a lofty nave, chancel, and north aisle, with a clerestory window, and the nave of the present church will become a south aisle, and the present chancel a choir aisle. The vestries will be on the north side of the new chancel. The organ-chamber will be over the clergy vestry. The south wall will be taken down to about half its present height, and what remains will be faced with the same material as the new work, windows will be inserted and a clerestory introduced to the south aisle. Eventually the tower and spire will be ceased with stone. The galleries will be removed, and the church will afford sitting accommodation on the ground floor for 1,060 persons. The work has been divided into sections, and it has been decided to complete the new nave, with aisle and clerestory, first, the contract for that portion amounting to 4,565*l.* The second portion includes chancel, north porch, and vestries, and will cost 2,545*l.* 10*s.* The exterior walls of the church will be of red Alveley stone, and the interior of red and white Ruscomb bricks. The architect is Mr. J. A. Chatwin, of Birmingham, and the builder, Mr. T. Collins, of Tewkesbury.

MUNICIPAL BUILDINGS, SALFORD, AYRSHIRE.—The new Public Hall and Municipal Buildings at Salford were opened on the 24th ult. The hall has been erected on the site formerly occupied by the old Parish School. The principal entrance is in a large two-story block fronting Countess-street. This block consists of the main corridor and office on the lower floor and the court-room on the upper floor. An archway gives access to the entrance-hall, the chief features of the design are the low half-truncated tower and large central pedimented gable. The main lobby and staircase are reached by the entrance corridor, which extends along the whole width of the great hall. The public hall has been placed lengthways between the Countess-street block and Green-street, the platform being at the other end. Wide passages extend round the walls at both sides, and exit side doors will be placed both at the platform end and in the main lobby. In the public-hall sitting accommodation is provided on the ground floor for 700 people, exclusive of the platform, while the gallery is capable of holding 150 more. A wide and easy access to the upper floor, in connection with a landing, gives access to the gallery on the left, and to the new upper hall or court-room on the right, and to the old hall. The court-hall has a deeply-coved ceiling, lined dados, and there is a small platform at which access can be had from both sides. There are also retiring-rooms, a cloak-room, and lavatories. The public-hall measures 33 ft. by 41 ft., and the court-room 48 ft. 6 in. by 29 ft. Messrs. W. H. Howie and H. D. Walton, Glasgow, are the architects.

SOCIETY OF ARTS.—The first meeting of the one hundred and thirty-ninth session of this Society will be held on Wednesday next, the 16th, when the opening address will be delivered by Sir Richard Webster, Q.C., M.P., Chairman of the Council.

FOREIGN AND COLONIAL.

FRANCE.—It is announced that for reasons of economy the post held by the late M. de Joly in the Chamber of Deputies will not be filled up.—On November 13 the monument erected by subscription to the memory of the painter Feytaud will be inaugurated in the Montmartre Cemetery. This monument, which has been executed by M. Farge, architect, is ornamented with a bust of the artist, and an allegorical figure, by M. Guilbert, who designed the monument to Etienne Dolet.—The building of the new galleries for the Natural History Museum have just been commenced; they are being built by M. Dutert, along the Rue Buffon. These galleries are to replace the old buildings in the Rue Cuvier, in which are the paleontological and anthropological collections.—M. Jules Guiffroy, professor at the Ecole des Chartes, is shortly going to publish the catalogue of the Museum of National Archives, which is very rich in ancient and curious documents.—The Pont de Conflans, between Charanton and Ivry, has just been inaugurated, and we now hear of the laying of the first stone of the new bridge which is to connect the Commune of Bonneuil to that of St. Maux les Fosses. This bridge, which crosses the Marne, will consist of stone piers, connected by a metal floor. It will be inaugurated next August.—The Bibliothèque Nationale has just been enriched by a manuscript of Jean Guichard, containing six chapters of an *Etiquette* or architecture. In a few days a new hospital for old people will be opened at Neuil (Seine-et-Oise). It has been paid for by the Municipality of that town.—The Society of the Amis des Arts de Pau will open their twenty-ninth annual exhibition from January 15 to March 15, 1893.—The jury on the competition for rebuilding an Exhibition of paintings at Biarritz has just given its judgment. The first prize was awarded to M. Felix Calinaud, architect, Paris, who is to execute the commission. The second prize has been given to M. Henri Nodet, also a Paris architect, and the third to M. Raymond Mévior, architect of the Département du Gers.—Several important works are shortly to be commenced in the town of Verona. Amongst the number we may mention a large theatre, a bridge over the Garonne, and two foot-bridges over the Canal du Midi.—The Director of Fine Arts in communication with the Municipality of Tours with a view of obtaining the transfer of two magnificent pictures by Mantegna to the Louvre. The two pictures, *Christ in the Garden of Olives*, and the *Resurrection*, were taken at Verona during one of Napoleon's campaigns in 1803. As a compensation, the Director of Fine Arts has offered to the town two pictures, one by Millet and one by Poussin.—The death is announced of M. Alexandre Brisse, in Rome, at the age of 72. He undertook and carried out the drying up of the Lake Fucino; the expenses, which amounted to 330,000,000 francs, were defrayed by the Prince Torlonia.—We regret to hear of the death of M. Marteau, architect of the Département du Nord, at the age of 79. M. Marteau was member of the Société Centrale des Architectes, and always followed with much interest the work of the Annual Congress.—A new bridge, to be called the Pont Mirabeau, is shortly to be made; it will unite the Auteuil and Grenelle quarters of Paris.

BERLIN.—Professor Reinhold Begas has now been commissioned by the Emperor to prepare a new design for the National Monument to the late Emperor William, which is to have its position in front of the Royal Palace. The drawings and models are to be placed before the Imperial Parliament next session.—The Government has granted about 5,000*l.* towards the expenses incurred by painters and sculptors who intend contributing to the German Art Collection which is to be exhibited at Chicago. The contributions will have to pass two juries prior to being accepted by the German Special Commissioners at the exhibition.—A memorial to the late eminent archaeologist, Professor Karl Bötticher, has been erected on his grave in the Dreifaltigkeits churchyard. There was an impressive ceremony in connexion with the official act of placing it into position. Many pupils, friends, and admirers of the savant were present. As in the case of Schliemann, the design of the monument has been selected from a series of original sketches made by the deceased.—There is apparently now to be an official investigation into the qualities of the various systems of "fire-proof" construction used in Prussia, and more especially a thorough examination of the various combinations of iron and concrete. A special commission of three is to take the matter in hand, and its work will be greatly facilitated by the powers given to its members. The three members will be (1) an eminent engineer of the Government Board of Works, (2) the principal of the great Testing Station at Charlottenburg, and (3) the chief officer of the Berlin Fire Brigade.—Rapid progress is being made with the reconstruction of the antiquated wooden bridges over the river Spree. There are only three of these ancient structures left, and two of these are soon to be taken down.—A rather sensational case is at present interesting German architectural circles. It has been discovered

that a so-called "agent" exists who pretends that, through his influence, he can help architects to win competitions opened in out-of-the-way countries, such as the Balkan States or South American Republics. This "agent" apparently also manages to supply his client with copies of the competition regulations prior to their being made public, thus giving him the advantage of having more time than other competitors to execute them. The "agent's" fees are moderate, i.e., only 20 per cent. of the premium or commission his client obtains. He is able to give references as to past success. A Munich architect has published a letter written by this "agent" offering his services in the Bucharest Railway Terminus competition lately opened.

MISCELLANEOUS.

LODGE "QUANTON CORONATI."—On the 8th inst. Professor T. Hayer Lewis, Past V.P. R.I.B.A., was installed as Master of the "Quanton Coronati" Lodge of Freemasons. Of this lodge, which was established in 1884, Major-General Sir Charles Warren was the first Master, and Mr. Walter Besant the first and only treasurer. Attached to the lodge is a Correspondence Circle, composed of subscribers to its "Transactions," and numbering between 1,400 and 1,500 members, who are literally and actually scattered over the face of the globe. Papers are read at all the meetings, and the publication of ancient Masonic MSS. is being steadily proceeded with. For full membership a literary or artistic qualification is essential.

PROPERTIES FOR SALE.—At the Mart, on Monday next, the two large houses, known as "The Elms" and "Combe Hill House," with their grounds, having frontages to Park-lane, Upper Coombe-street (formerly Coombe-lane), and High-street, together with two adjacent tenements, covering seven acres in all, at the south-end of the town. The former was occupied by the late Sir Thomas R. Edridge; the latter, a much older residence, by the late Baron A. Heath, Consul-General for Italy. On the 25th inst., the Strand Theatre, a freehold site of 7,845 sq. superficial, let, together with the house in front, on lease at 1,850*l.* per annum, for a term of which twenty-two years are unexpired. The theatre had been originally built for a panoramic exhibition, and was altered into a playhouse about sixty years ago. Also the freehold of No. 14, Old Bond-street, leased at 750*l.* a year to Messrs. H. P. Trustitt & Co.; with the freeholds of Nos. 8, 9, and 10, Dover-street, and of Nos. 46-7, with the York Hotel, in Albemarle-street. The hotel stands on a site of 6,372 square feet, and is let on lease until March, 1904, at 1,500*l.* per annum. The Albany, Piccadilly, of which five "sets" of chambers were appointed this last Tuesday, was designed, that is to say, the central block, by Sir William Chambers, and purchased by Viscount Melbourne of Lord Holland, in 1770. It was afterwards occupied by the Duke of York and Albany. The courtyard and buildings cover the sites of the houses of Lord Sunderlan, Sir John Clarges, and Lady Stanhope, of which the gardens extended northwards, to what was Vigolane.

ADJUSTABLE WOOD CHIMNEY-PIECES.—Mr. John Parker of Birmingham, sends us a sheet of drawings of "adjustable wood chimney-pieces," the special feature of which is that the lintel forming the frieze is made with a decorative treatment in the centre only, the ends being left plain and made to fit into various lengths to suit various sized openings. The shelf is made with sliding dovetails to fit into slots on the top of the jambs, at whatever distance apart they are placed. It will be a convenience and saving to builders choosing chimney-pieces out of stock, though it cannot be said to promote artistic design in such things.

THE SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Town Hall, Westminster, on Monday evening last, Mr. Joseph William Jun., President, in the chair, a paper was read by Mr. W. H. Holtum, on "The use of Steel Needles in Driving a Tunnel at King's Cross." The author alluded to the advantages derived in working the traffic to and from the London terminus of the Great Northern Railway, in consequence of the execution of an additional tunnel, with approaches, opened this year for goods and passenger traffic. The new tunnel is on the western side of the two older tunnels, the first of which was built in 1850. In length each is 527 1/2 yards, the inverts throughout resting on the Middle clay of the "London Clay" formation. The two lower tunnels have a clear width of 26 ft., or two more than the original central tunnel. Similar conditions obtain for the three tunnels, and they pass, in a northerly direction, level beneath the Regent's Canal, which is supported upon cast-iron crown pates carrying the girders that bed of the canal; thence the rail gradients rise in 371 and 111 ft. An opportunity presented itself for the introduction of a novel method (described and illustrated in the *Builder* for October 3, 1891, p. 256) for working out the excavation beneath steel bars, or needles having a thickness of only 2 in. in place of the ordinary timbering, which generally requires 18 in. excess of excavation around the extrados in order to build the arch of

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered. Includes entries for Municipal Buildings, Public Baths and Library, and various engineering projects.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Lists various construction and engineering contracts.

CONTRACTS.—Continued.

Continuation of the Contracts table, listing various engineering and construction projects with their respective requirements and architects.

PUBLIC APPOINTMENTS.

Table listing public appointments, including positions like Temporary Sanitary Inspector and Assistant Sanitary Officer, along with their salaries and appointing authorities.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv, vi, & viii. Public Appointments, p. xx.

the tunnel. The first needles used were those patented by Messrs. Jennings & Stannard. The author described the form and method of driving these needles by means of screw-jacks; also the various contrivances used to fill up the 2 in. annular space left over the tunnel when the forward movement of the needles began, and the plan, ultimately adopted, of running fine cement concrete along chases left at intervals within the outer ring of the tunnel arch, whereby the chases as well as the space behind the advancing needles became filled with an imperishable material, and the subsidence of the surface of ground was reduced to a minimum not worth any serious consideration, although beneath the busy goods yard traffic which uninterruptedly continued during the construction of the tunnel. Reference was made to the use of trussed cills, instead of the usual long rakers, to the upper cills of the face timbering, which had the advantage of leaving the temporary roads of the tunnel less obstructed, as well as having no raker holes in the invert to fill up afterwards. Another introduction, designed by Mr. E. Duncan, to obviate a tendency the needles had, at times, to drop out of place was that of interlocking the needles so as to form an almost solid steel roofing of 2 in. in thickness. These were worked northwards from Nos. 1 and 2 shafts, whilst the earlier needles did duty southwards from Nos. 2 and 3 shafts, in lengths averaging 6 ft. Where underpinned piers interposed within the area of the proposed tunnel and prevented further driving, the steel needles were removed and timber bars were resorted to, and built in as the work proceeded. In conclusion, the author referred to the evident economy of this new method of driving tunnels, or culverts; and he considered that engineers would find among the various conditions under which tunnelling was to be executed, that this new method has a large sphere of usefulness in effecting both economy and good workmanship. The engineer for the King's Cross tunnel works was Mr. Richard Johnson, M.Inst.C.E., and the contractor was Mr. Henry Lovatt.

ARTISTS' BENEVOLENT FUND.—The eighty-third anniversary dinner of this Fund is fixed for Saturday, the 20th inst., at "The Criterion," Sir Edward Clarke, Q.C., M.P., in the chair. We may mention here, on the authority of the Committee, that the "Artists' Fund" was established in the year 1810, and received in 1837, from George IV., its patron, the gracious patronage and support of the Queen. It consists of two divisions. The first, the Artists' Annuity Fund, is raised and wholly supported by the contributions of its members for their own

relief in sickness and old age; it neither asks for nor receives any support from the public. All artists in painting, sculpture, architecture, and engraving are eligible to become members. On the other hand, the second, the Artists' Benevolent Fund, is a purely charitable society, and has for its object exclusively the relief of the widows and orphans of members of the Annuity Fund left in need; it is supported by the donations and subscriptions of the patrons of the fine arts and artists, and annual contributions of the members of the Annuity Fund. These annual widows, and to the orphans, are respectively supplemented by donations and from the interest on benefactions of Miss E. L. Pvo and the late Mr. Edward Absolon. The claims of all widows and admitted at once, and without limit to their number. During the past year forty-four widows and seventeen orphans received annuities, amounting in the whole to 981l. 2s. The annual sum of 200l. is paid to each widow, and the annual sum of 20l. each orphan under the age of sixteen. The Committee are anxious to increase these allowances. Since the institution of the society the sum of 55,407l. 16s. 5d. has been distributed in relieving and assisting artists, whose circumstances render such assistance necessary. Further information as to the Fund may be had from Mr. L. Young, the secretary, 23, Garrick-street, Covent-garden, W.C.

THE ENGLISH IRON TRADE.—The situation of the English iron market shows little alteration, the fallings-off in shipments of iron and steel, as evidenced by the Board of Trade statistics, continues. The increase of 19,914 tons in the stocks of Cleveland pig announced in the monthly returns has caused further quietness in that district, and in few instances in the crude-iron branch there much activity. The manufactured-iron department continues to exhibit a depressed tone, and in steel little change is to be noted. Tin-plates exhibit a slightly better demand. In shipbuilding and engineering only a moderate number of inquiries are to hand. The coal trade is tolerably steady.—Iron.

RECENT PATENTS.—Pressure on our space compels us to hold over until next week our usual list of new patents.

MEETINGS. SATURDAY, NOVEMBER 12. Sanitary Inspectors' Association.—Inaugural address by the Chairman, Mr. Hugh Alexander. 6.15 p.m.

MONDAY, NOVEMBER 14. Surveyors' Institution.—Opening Address of the Session by the President, Mr. Charles J. Shopp. 8 p.m. Clerks of Work Association (Carpenters' Hall). Paper by Mr. D. M. Nesbit. 8 p.m.

TUESDAY, NOVEMBER 15. Institution of Civil Engineers.—(1) The Hon. R. Parsons, M.A., on "Ballast Graving-Dock, New South Wales." (2) Mr. W. Edfield Kelly on "The Alexandra Graving-Dock Belfast." Mr. Robert Plowwell on "Construction of a Concrete Pier at Newport, Monmouthshire." 8 p.m. Sanitary Institute (Lectures for Sanitary Officers). Mr. J. F. J. Sykes on "Objects and Methods of Inspection." 8 p.m. Glasgow Archaeological Society.—Annual Meeting. Sir John Evans on "The Colosseum of the Antonines." Glasgow Architectural Association.—Mr. W. Forrest Salmon on "Michelangelo: His Life and Works." 8 p.m.

WEDNESDAY, NOVEMBER 16. Society of Arts.—Opening Address of the Session by Sir Richard E. Webster, Q.C., M.P. 8 p.m. British Archaeological Association.—(1) Mr. J. Romilly Allen on "Early Christian Monuments of Glamorgan." (2) Paper by Mr. A. C. Fryer, entitled "Notes of Recent Discoveries." 8 p.m. Royal Meteorological Society.—(1) Paper by Mr. J. Lovel; (2) Mr. W. H. Dines, B.A., on "The Measurement of the Maximum Wind Pressure, and Description of a New Instrument for Indicating and Recording the Maximum." 7 p.m. Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

FRIDAY, NOVEMBER 18. Architectural Association.—Mr. Paul Waterhouse on "Some Mysteries of Modern Architecture." 7.30 p.m. Sanitary Institute (Lectures for Sanitary Officers). Mr. J. F. J. Sykes on "The Nature of Nuisances, Including Nuisances the Abatement of which is Difficult." 8 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT. OCTOBER 29.—By A. Savill & Son (at Southend): Three f. cottages, Great Wakering, Essex, and 2a. or 13a. r. 16l. 200l.; 1 f. cottage and blacksmith's shop, r. 20l., 250l.; four f. cottages, r. 34l. 10s. 250l.; an enclosure of f. land, 11a. 2r. 35p. r. 12l. 250l.; six f. cottages, North-st., Rochford, r. 42l. 16s. 710l.; two cottages, Pettitewell, r. 22l. 420l.; enclosures of f. land, near Southend, r. 2s. 24s. r. 15l., 1,400l.; two f. cottages, Laidon Hill, r. 14l. 240l. OCTOBER 31.—By G. B. Hilliard & Son: "Fairland" Farm, near Ongar, and 221a. 3c. 39p. f. 1,825l.—By

The Builder.

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Design for a Town House.—By Mr. Arthur Bartlett, A.R.I.B.A.....	Double Page Ink Photo.
New Training College, Norwich.—Messrs. Oliver & Leeson, Architects.....	Double Page Photo-Litho.
Proposed Almshouses, Luton, Wilts.—Mr. C. E. Ponting, Architect.....	Single-Page Ink Photo.
Competition Design for Oxford Municipal Buildings.—By Mr. Halsey Ricardo.....	Single-Page Ink Photo.

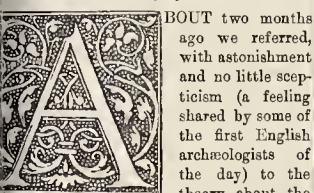
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The New Chronology of the Pantheon.



ABOUT two months ago we referred, with astonishment and no little scepticism (a feeling shared by some of the first English archaeologists of the day) to the theory about the Pantheon which had been propounded by M. Chedanne, a young French architect, and set forth in an article in the *Revue des Deux Mondes* in August last by the French sculptor M. Guillaume, to the effect that the rotunda was not of the age of or the work of Agrippa, at the date of 27 B.C. but a building of the second century A.D., erected during the reign of Hadrian, and that it was erected on to the portico instead of the reverse process hitherto believed in. The inherent architectural improbability of the portico being erected first and a circular building added behind it seemed too strong an aesthetic argument to be passed over, and it must be believed that the rather inflated style of M. Guillaume's article, which was manifestly a case of trumpet-blowing for French archaeology, was not calculated to predispose one to an attitude of faith. Whatever we may think, however, of the good taste of the *Revue des Deux Mondes* article, it would appear that the trumpet has not been vainly blown, and M. Chedanne has led the way to one of the most important discoveries of some time back in Roman archaeology, and has established the fact of the later date of the rotunda, though as we shall show, there is room for another theory than the probable one of the round building having been actually built against and fitted to the portico as it stood. Possibly if M. Chedanne had written the article himself, in a more practical style, and accompanied it with representations of some of the objects which furnish the evidence for this view, he would have found more ready acceptance than was likely to be accorded to the rather exuberant language of M. Guillaume.

was built by Augustus's able Minister and relative, Marcus Vipsanius Agrippa, during his third Consulship, that is, in the year 27 B.C. The inscription runs thus:—

M. AGRIPPA . L . F . COS . TERTIVM . FECIT.

And this inscription has naturally been taken to refer to the whole structure; more especially since the point of junction between the great portico and the rotunda behind it appeared to show that both were of the same date and had been built together—not that one had been added to the other.

Early in the present year, 1892, the appearance of certain patches of damp on the inner surface of the dome rendered necessary some repairs to the stucco lining of the coffers of the dome and a careful investigation of the point where the rain was able to soak in from the outside.

The Italian authorities very kindly allowed the work of repair and investigation, together with the erection of the necessary scaffolding, to be placed under the superintendence of M. Chedanne, who is one of the Prix de Rome students in the Villa Medici.

This enabled M. Chedanne to make a new and very careful set of measurements of the whole building, and to produce a most valuable set of drawings for his *enroulé*, to be submitted to the authorities of the *École des Beaux-Arts* in Paris.

As already noted, the result of the investigations which were thus made has been described, with a certain amount of rather tentative theorising, by M. Eugène Guillaume, the able French sculptor who is now Director of the *École Française de Rome*, in the *Revue des Deux Mondes* for August, 1892, p. 562; and the subject has also been treated by the Roman archaeologist, Signor F. Bongioanni, in the "Nuovon Antologia," vol. xli., serie iii., fascicolo del 1° Settembre, 1892. The conclusions arrived at by these two authorities are not altogether the same, and it may, perhaps, be well to indicate briefly what appear to be the really important pieces of evidence, and what the most probable conclusions to be derived from them seem to be.

First, with regard to the comparatively late date of the rotunda, the one really valuable and, it may be said, conclusive piece of evidence, is derived from the inscriptions stamped upon the bricks which are used as

facing and as bond-courses in the solid concrete both of the drum and of the dome.

A large number of these bricks or tiles (*tegule bipedales*) have been withdrawn from various parts of the structure, and all their stamps agree as to the date of the tiles being not earlier than the first half of the second century A.D.

As examples of these brick stamps we may quote the following; the inscriptions are arranged in the usual manner in two concentric circles around a central badge or symbol. It is to be regretted that neither M. Guillaume nor Signor Bongioanni have in their articles quoted these inscriptions, which are by far the most conclusive evidences of date.

1. DOL ANTEROTIS SEVERI
CAESARIS N
Badge or trade-mark, a bull's head. This may be translated: "Clay work of Anteroe Severus [slave or freedman] of his Majesty."
 2. C AQVILI APRILIS EX PRAEDI
CAES BIFEDALE DOLIA
Badge, a pine-cone. "Two-feet tile of clay-work made by Caius Aquilius Aprilis on the imperial clay-field."
 3. ROSCIANI DOMIT AGATHOB
Badge, a bust of Isis between a palm-branch and a sistrum. The translation of this is doubtful; it may mean "Clay-work of Roscianus [freedman] of Domitianus Agathobulus."
 4. APRILIS CN DOMITI
AGATHOBVLI
Badge, a bull's head between two palm-branches. "Clay-work of Aprilis [freedman] of Cn. Domitianus Agathobulus."
 5. TEG DOL DE FIG IVLIAE
PROCVL FLV NEG
"Tile-work of clay from the potteries of Julia, the daughter of Proculus."
- All these inscriptions have previously been discovered on bricks in other buildings, and they are known from various reasons, to be of about the time of Hadrian. Brick-stamps of any kind of as early a date as Agrippa's time, in Rome at least, are unknown.
- The fact that *tegulae* bearing these inscriptions have been found in many different parts both of the walls and of the dome is sufficient evidence that they do not belong to

a partial repair of an older structure. They must, therefore, be taken as evidence that the existing rotunda and dome were not built till about a century and a half after the time of Agrippa.

The second important piece of evidence was the discovery of an earlier pavement nearly seven feet below the present floor of the rotunda, showing that the original Pantheon stood at a considerably lower level than the existing building.

On the whole, the most probable theory of the structural history of the Pantheon appears to be this,—that Agrippa built the existing portico, which bears his name, as the approach to a *cella*, which was probably of the normal rectangular form; the pavement of this *cella* being that of which a portion has been exposed at the lower level.


Then, in the time of Hadrian, the original *cella* was pulled down, and, in its place, the present domed rotunda was built, with its floor at the higher level.

Agrippa's portico was at the same time taken down and carefully rebuilt on to the new circular *cella* at the higher level; the inscription on the frieze not being interfered with.

This would account for the absence of any signs of two different dates at the junction of the portico with the rotunda. The inscription, therefore, must be taken to refer to the portico only, with its sixteen magnificent monolithic columns of red and grey Egyptian granite.

At present this theory is only conjectural, but there can now be little doubt as to the rotunda not being earlier than the second century A.D. Further investigation may possibly throw clearer light on this difficult and very interesting problem.

A FORGOTTEN ROMAN SITE.

ESS than four miles from the still flourishing city of Seville, and accessible therefrom either by means of a raised *carrétera*, or high-road, leading across the often flooded lowlands, and then skirting the foot of the tertiary hills of the district; or by a footpath passing through fields and oliveyards, but often rendered impassable by floods, lies the site of the very little celebrated city of Italica. It is at the foot of the hills, but is not, like Seville, on the banks of the rushing Guadalquivir, and the visitor who stands among its few ruins wonders why it ever was a city. Yet, during the Roman dominion in Spain not only was it a city, but it appears to have been the most important settlement of the district. No less than three emperors were natives of it. Here, in September, A.D. 52, was born the great Trajan; here, also, according to Spanish authorities, Hadrian, Trajan's adopted son, first saw the light, and Theodosius the Great is also claimed as a native of Italica. In these days, though Seville was also a Roman colony, Italica appears to have been the larger, and to have had the better-known place as its dependent. Of history Italica seems to have but little, but the site has served for a perpetual quarry to the many generations of Moors and Christians, who have erected their alcázar, mosques, churches, and palaces in the neighbouring city; and, though at the present time there is little to be seen above ground, there is no doubt that enough exists below it to give a rich reward to those who may undertake an intelligent excavation.

The principal extant ruin is that of the "plaza," "circo," or amphitheatre, only small portions of which rise above the level of the ground, while much seems to have been excavated in the rock. Some of the vaults beneath the ranges of seats are still entire, and in one of them is a perennial well of water. The arena and the lower tiers of seats are nearly perfect, while masses of tumbled rubble work are all that remain of the higher walls. At one extremity of the ruin a marble slab gives the information that the area was excavated under the orders of

the "Comision de Monumentos," in the reign of Isabel II. This, with fragments of a mosaic pavement, remains of the walls of some houses, an elliptical tank that seems to have been a vivarium, and a few sections of columns, is about all there is to be seen. For the rest of what has been found upon the site we must go to Seville. How many of all the Roman capitals that grace the shafts in the courts of the Alcázar, how many of the shafts in cathedral, church, and palace, came from Italica, it is impossible now to tell; but it is certainly known that the numerous statues, some of them perfect, to be found in the Casa del Pilatos (the palace of the Dukes of Medina-Celi), and in the Museo Provincial, that partly fills the ample precinct of the ex-convent of La Merced, were brought from there. In the former edifices each angle of the fountains court is adorned with a complete Roman statue, one of them of Minerva; while in the garden and in other parts of the building are several columns, busts, and statues from the same convenient quarry. The museum contains two or three more or less imperfect statues of Trajan, and a considerable number of architectural fragments,—just enough to raise the wish that systematic excavations could be undertaken upon the site,—a consummation not likely to be realised, even with the best possible wishes, in the present impoverished condition of Spanish finances.


Ruined though the amphitheatre of Italica is, it is, in many respects, more impressive than the almost entire one at Segovia, which, until very recently at least, has been used as a bull-ring or Plaza de Toros. The impressiveness of the latter amphitheatre is diminished by the changes it has undergone in modern times to fit it for a bull-ring, while the other remains unchanged, and the visitor can dream in solitude of the former grandeur of this now almost forgotten city. As the plough passes over the fields in the vicinity it often brings up coins of copper, iron, or silver, stamped with the names of various Emperors, and our would-be guide from the neighbouring village of Santiponce boasted his possession of several.


It is not known why or when Italica ceased to be the abode of a busy population. Its downfall must have occurred during the troublous times of the struggle between Sævi and Goths, during the domination of the latter; or in the early days of Arabian occupation, for after this time it is only known as a site from which marbles might be obtained. It has already been said that the river does not now pass by Italica, but it appears possible that in Roman times it approached close to the walls. Up-stream, a few miles from Seville, the Guadalquivir flows at the foot of the hills, and down-stream, five or six miles from the latter place, it closely hugs the same low range of elevations. Whenever there is a freshet, a considerable portion of the extra waters find their way through what seems to have been the ancient channel, and at such times it is impossible to reach Italica and Santiponce except by means of the high road which crosses the flood by a viaduct. If in ancient times the river flowed by Italica, its recession from its former course may, in part at least, account for the decay of the place.


The modern village of Santiponce is situated about half a mile nearer to Seville than the amphitheatre of Italica, and, like most of the villages of Southern Andalusia, is a collection of mud or rubble-built, one-story habitations, all coated externally with plaster, and whitewashed. This whitewashing of the outside of everything is general in Southern Spain, and necessarily gives to the villages, in spite of their vineyard and oliveyard surroundings, a monotonously glaring aspect. In such a city as Seville the effect is worse, for the universal plaster and whitewash conceals it would be hard to guess how many beauties in the form of Arabian arabesque (the dim forms of a few of which may be traced), and Roman, Arab, and Mudejar (transitional) sculptures. In their rage for a clean, white surface, some of the improvers (were they churchwardens?)

have at various times cut away the base of the colonnettes of the recessed porches of churches. The half-ruined pile of minaret, monastery and parish church which sits upon a mound at the entrance of Santiponce merits some attention, since within it is a fine altar, with some of the best statues of Montañes, and also the tombs of the Guzman (Guzman el Bueno) and his wife.

NOTES.

HE President of the Local Government Board has issued a semi-circular to the Local Boards throughout the country, pointing out the desirability of employing artisans out of work during the winter on useful public works. The advice is so general and it is to be hoped that Local Boards throughout the country will try to follow it. But the laying-out of recreation grounds, making of footpaths, and so forth, is a work which is always, so to say, at hand, and a great deal of the unemployed labour, to say the least, is also very unsatisfactory. Men employed on semi-pauper labour do not work well. The President of the Local Government Board expressly points out that the wages should be below the current rate, so as to prevent a petition with regular employment. But men under such circumstances work with little heart, and many, who at no time are ready to work, will only make a pretence of working. Very considerable supervision is therefore necessary over work being done by this kind of labour, and it renders it more costly. On the other hand, a great deal of work, useful to the community, and which will afford a livelihood to artisans out of work, may be done during the winter months if Local Boards will endeavour to attend to the business with intelligence and good feeling. It is certain that the object aimed at in this circular is most praiseworthy, and though it will, we fear, raise anticipations which cannot be realised, yet it will enable a certain number of artisans who are out of work, and yet willing to work, to obtain a small wage during the current winter, to the advantage of the public.

HE proposal to take proceedings by law against the directors and contractors of the Panama Canal Company, including Mr. Lesseps, is a sad downfall for the project of that once ambitious enterprise; but not so can be surprised at the feeling which has to do with it. The light-hearted manner in which Mr. Lesseps vouched for the success of the scheme, the difficulties of which he never even taken proper means to understand, and the flagrant pretence of the visit of investigation to the works, which it is obvious that nothing was investigated, unquestionably amount to an obliquity in dealing with the hopes and money of other people. Whether, however, the charge can really be consolidated into one of legal criminality seems rather doubtful.

LTHOUGH the International Exhibition at Berlin is abandoned for the present, a competition, promoted by the "Architekten-Verein," for proposals as to the locality and plan of the site for such an exhibition, has aroused much interest. The Prussian capital has no natural site for an exhibition within its area such as Paris can boast of. The Champ de Mars of Paris is about 3500 ft. from the Tuileries, whilst in Berlin no practicable site could be found within that distance from the Royal Palace. Of the fourteen competitors, two, it is true, have tried to make suitable sites within that limit, but their proposals would involve the demolition of a fine railway station, a river harbour, and other expensive works. One of the competitors proposed using a part of the existing drilling-grounds on the south side of the city, and seven selected the historical Grunewald to the west. Among the advantages of the sites might be named the agreeable landscape

surroundings and approaches by way of the finest parts of Berlin; but their distance, which varies from 7 to 14 kilometres, tells strongly against them. Two competitors have selected sites to the east. This position can by no means claim the merit of good approach, but the ground proposed is pleasantly situated within 5 kilometres from the Palace.

WE print among our correspondence this week a letter from Professor Roger Smith suggesting that, as the necessity has arisen for appointing a new curator to the Soane Museum, the opportunity should be taken to render the contents of the Museum more accessible to the public. If this meant the repeal of the rather eccentric regulations as to days of visiting, and leaving the Museum open every day, or on the same days of the week, all the year round, we should be quite in favour of such a change. But to take away the contents of the Museum from the house, and, moreover, to divide them, as Professor Roger Smith proposes, would be not only to throw over the obvious wish of the testator in a main point, but to very much impair the interest of the Museum. Sir John Soane evidently wished his very originally-planned house, with its collections, to remain not only as a gift to the nation, but as a kind of monument to himself, and it would be, to our thinking, unjustifiable to frustrate this intention; while to the public, part of the interest of the Museum consists undoubtedly in the house itself, and the special and individual character of the Museum consists in the house and its contents taken together, and would be destroyed if they were separated. While, therefore, we are very glad to give our correspondent the opportunity of making his suggestion, we must say that we cannot agree with it, and that we hope no change will be made in the Soane Museum, unless, as already suggested, to simplify the arrangement of days for visiting it.

WE have received particulars and some examples of a new material, or rather method, for street-paving, produced by the "Composite Block Road and Paving Company," which seems worth attention. The special points about it are that it is asphalt paving in the form of blocks or sets about a foot square, and that it is treated so as to produce a special surface different from that of the usual asphalt pavement. The blocks are cast in a mould in which is placed a grating of wood or iron which is surrounded by and embedded in the asphalt, apparently with the object of forming a filling to the slash and diminishing the hulk of asphalt. The bottom of the mould is shown with rough bits of stone or granite which become imbedded in the asphalt; this surface, lowest in the casting, being the upper one when the block is laid down; the result is an asphalt surface slightly roughened by granite or stone chips embedded in it, and it appears to form a surface which will be comparatively noiseless for wheels, though not quite so noiseless as the ordinary asphalt roadway, while affording a better foothold for horse than the latter. The advantage of having an asphalt pavement in blocks is obvious in regard to the relaying of streets, which could in that case be carried out bit by bit, with little disturbance to traffic, instead of fencing off half a street at once for repair. As to the probable cost of the method we have no information; we should expect to find it rather an expensive form of pavement; but the patentees really seem to have produced a road-surface which is comparatively smooth without being slippery.

WE have before us the annual report of Mr. Lovegrove, Surveyor to the Board of Works for the Hackney District, and that of Mr. Mason, the Surveyor to the Vestry of St. Martin-in-the-Fields. Among the special points touched on in the Hackney Report we find a comment on the disfigurement of the

streets by loose paper, a nuisance which in many districts of London requires checking with a strong hand. Mr. Lovegrove says, "the sources of supply are loose paper from hoardings; tradesmen's circulars received by passers-by only to be thrown in the road, and often scattered by handfuls from a cart driving rapidly along the streets, also thrown away by tradesmen and street hawkers." Men are employed (at the cost of the ratepayers) in clearing away much of this, but shortly after clearance the street is as full of paper again. It is observed at the dust-cart shoot that often one-third of the load consists of paper. In some districts the dustmen are ordered not to take paper, this coming under the head of articles which ought to be burned in the house. Some stringent legislation on this subject seems necessary, though it must be admitted there might be difficulty in applying it. In regard to paving works we observe that the Surveyor reports favourably of concrete-paving laid in panels about the size of ordinary flagstones; the concrete-paving laid *en masse*, he reports, often shows ridges at the kerb lining, due to expansion. In the St. Martin-in-the-Fields report we note that "in consequence of increased responsibilities resting with local authorities by reason of the new Public Health Act," special regulations for the removal of refuse have been adopted, which will come into force in April next; but the nature of the intended regulations is not here stated. The new regulations for house drainage, which have been in force for nearly a year, are printed at length in the report. They seem to be thorough and practical; how far they are an advance upon the previous regulations of the district we are not aware. New regulations for vaults under footways are also given. Among other points it is mentioned that an upcast iron ventilating shaft has been carried up above the adjoining buildings to ventilate a newly-laid sewer, and property owners are exhorted to offer no opposition to the erection of these shafts, as the best means of relieving the sewers of noxious gases. It is also mentioned that the Surveyor is preparing, in accordance with instructions, a new plan of the parish brought up to date: the plan consists in a correction of the Ordnance Survey plan of 1874. It will probably require a good deal of correction, and the Surveyor will be wise to take nothing for granted on the Ordnance plan.

WHILE on the subject of sanitary district work, we may call attention to the absurd and inconvenient habit of the road-sweepers in some districts, of collecting the mud for the carts, when the streets are muddy after rain, at the corners and crossings of streets, just where it is in every one's way. Our special experience of this has been in the St. Giles-in-the-Fields district, where on one morning in a short walk along main thoroughfares, we came upon no less than four collections of mud, five or six inches deep, at street crossings, just where any one taking a straight course across to the opposite street corner would walk into it. Those who are responsible for road cleaning should see that the street sweepers collect the mud where it is most out of the way, instead of putting it exactly where it is neither wanted nor expected.

ACCORDING to *L'Architecture*, the French architects are considerably annoyed, and with reason, at the apparent intention of the Government to take the rebuilding of an important structure, the Opéra Comique, out of the direct control of the architects, by simply putting the building into the hands of a financial company to carry out according to their own ideas. There could be no worse method for securing anything worth calling architectural art in a national building, and it is to be hoped that a principle so opposed to all the best traditions of France in regard to architecture will be reconsidered. Even our own Government could hardly do worse than that.

THERE has been a great deal of architectural quarrelling in Zürich owing to successive invitations to Messrs. Fellner & Helmer, the well-known Vienna theatre architects, to design first a theatre, and afterwards an assembly-room and concert-hall for Zürich. This second commission was too much for the local architectural association, who actually petitioned the promoters of the assembly-hall scheme to select one of its members as architect instead of "strangers," and it was arranged that a well-known Zürich architect should compete with the Vienna architects, the Zürich Board of Works acting as assessors. They pronounced the plan of the Vienna architects to be the best, but preferred the design of the Zürich architect, and the promoters, preferring plan to design, gave the commission to Messrs. Fellner & Helmer. This has been followed by an apparently very ill-judged attempt of the Zürich Architectural Association to throw the Vienna architects out of court on a charge of evading some of the competition regulations. The whole story is not very creditable to the Zürich Association, who would perhaps be better employed in studying theatre-planning than in endeavouring to keep out those who have mastered it.

WE hear that Thorwaldsen's famous lion at Lucerne has suffered much from decay of the surface of the stone from the effect of weather, and that a Swiss engineer has undertaken to repair the damage with a paste of his invention, which will also render the monument proof against the action of the weather for the future. It is to be hoped that the co-operation of a sculptor is to be secured in carrying out the repairs.

CORRESPONDENCE has already begun in the daily press on the inadequate supply of gas to houses in London during fogs. An insufficient supply of gas in a house is a less serious inconvenience than the same thing in the streets. But during recent fogs some of the London streets have been enveloped in darkness, the only light to guide foot and vehicular traffic being the light from shops at irregular intervals. It should be possible for the gas-lamps in important thoroughfares to be lighted at once. On street refuges the police should be able to light them without delay. This want of immediate light in foggy weather is one of the characteristic faults of the management of the metropolis, where any weather a little out of the ordinary run is a much greater inconvenience to the public than it would be if local authorities prepared for it.

WE read in the *Daily News* that Mr. Richards has recently been engaged in cleaning the mural paintings at Marlborough House, which, being the reputed work of Laguerre, were restored by Mr. Richmond, R.A., and the late Mr. Henry Merritt. These, we presume, are the paintings, chiefly of military subjects, with portraits, described by De Foe in "A Journey through England," 1722, and which, subsequently covered over with mock woodwork, remained hidden until thirty years ago. Marlborough House was built, 1709-10, by Wren, for the great Duke upon a plot of ground leased for fifty years to his wife by Queen Anne. The Duchess (who passed her widowhood here) used to declare that it cost her husband more than 40,000*l.* Having originally ground and first floors, surmounted with a halustrade, the house, with its grounds, stands on the sites of the St. James's Palace aviary and friary, and part of the garden, taken out of the park, of Secretary Boyle. An attic has displaced the halustrade; in 1885 the two wings were raised by an additional floor. The Crown bought the property in 1817; the house was

* Opposite lived Walpole. It is said he bought up some property, by the north gate, to frustrate the Duchess's intention to make a suitable entrance from Pall Mall.

occupied by Prince Leopold for several years, and Queen Adelaide. It was then adapted for the school of Design and the Department of Practical Art, together with the exhibition of the (Robert) Vernon gallery, and some pictures belonging to the National Collection—mostly by English painters. When George IV. was Regent, he wanted to connect Carlton House, Marlborough House, and St. James's Palace by a gallery for portraits of our sovereigns and famous countrymen.

THE Lincoln's Inn Benchers have granted a building lease of the vacant plot, about 2,500 ft. superficial, on the west side of Chancery-lane, by the north end of Stone-buildings. Mr. G. St. Pierre Harris, architect, has made plans and designs for a set of offices. These will hide from view the side elevation of No. 1 in the western block of Stone-buildings, designed 1756, by Sir Robert Taylor. We understand that the Benchers possess the working drawings made by his clerk, John Leach, afterwards Master of the Kolls.* Nos. 8, 9, and 11, having served for certain Chancery offices, were raised by one floor nine years ago, and converted into chambers. About the same time No. 10, the old Six Clerks' office (also by Taylor, 1775-6), was fitted up as a drill-hall and school-of-arms for the Inns of Court Volunteers. Pepps tells us how, in his anxiety to get his patent (as Clerk of the Acts) formally engrossed "in Chancery-hand," he "was forced to run all up and down Chancery-lane and the Six Clerks' office, but could find none that could write the hand that were at leisure." In Pepps's day that office stood some yards lower down the lane, and we think on the east side. Yet in J. Long's plan of Thicket-fields, drawn in 1592, to which we referred the other day in reviewing Mr. Blott's "Blemundsbury," the "Six Clerks' office" is clearly plotted on the west side, and opposite where the Rolls-house is now. The position shown on Long's plan agrees with the account of Sir George Buc, who says that the house in Chancery-lane which John Kedermister bought for the Six Clerks had been the town inn of the abbots of Norton, co. Lincoln, and afterwards "the house of one Herfleet, and of him it was called Herfleet's Inne; but now it is (or ought to be) called the Six Clerkes Inne, or Kedermister's Inne, of the aforesaid founder thereof." Part of Stone-buildings covers the site of the Black Friars' first settlement in London, where they abode for fifty-five years.† Next east was the inn of the bishops of Lincoln, near the Old Temple. In the plot we speak of an open flight of twelve stone steps leads down to a hollow alongside of a massive red-brick wall, standing north and south, in alignment with the middle line of Nos. 8-11, Stone-buildings, along the west side of Chancery-lane. The men have excavated an old drain, with a pointed arch, near the surface, and some privies in the hollow against a retaining wall along the lane.

THE Empire Palace of Varieties, designed by Mr. F. Matcham, and recently opened in Edinburgh, shows that such places of entertainment for the people are in demand in the provinces just as in London, where Mr. D'Oyly Carte's magnificent theatre has had to revert to Sir Augustus Harris. The Empire Palace takes the place of a circus, and stands where a similar but far less ambitious house, the old "Southminster," stood some twenty years ago. The new building shows great advance, not only on its old predecessor, but upon the present Gaiety Music Hall, the only house of the kind which Edinburgh has had till now. It will hold between two and three thousand, and is sumptuously enough "got up" to delight an audience which is probably not too

* Philip Hardwick, R.A., added the southern end of this block.

† In 1288 they conveyed to Henry Lacy, Earl of Lincoln, "totum locum et omnes domos nostras . . . extra Holborne ubi prius habitare et morari consuevit."

critical in matters of artistic fidelity. The scheme of decoration is pleasant and harmonious in colour, if rather rough in execution, and the decorative paintings are good of their kind, though they lack architectural framing. The style adopted is sufficiently hybrid to allow considerable laxity; crescents and stars in some profusion, and modelled elephants-heads for capitals, indicate, presumably, Oriental-Mohammedan leanings. The whole is a far-off reminder of the Eden Theatre of Paris, and it is, perhaps, to be regretted that the architect has not followed more closely the inspiration of that brilliant and able, if rather meretricious, interior. The ceiling and internal dome of the Empire Palace, moreover, would have lent themselves excellently to a genuine study of Moorish work; they might have been far more successful; a honeycomb vault rising from an intricate roof design (such as one sees all over Spain to this day) might have furnished a brilliant bit of artistic work that one greatly misses in the actual building. Externally the theatre is undeniably styleless and ugly, of brick unrelieved, and likely to foster Scottish prejudice against brick-work in general. Here again a little study of Spanish brick-work might have made a very different result. The only attempt at architectural treatment is over the principal entrance, a square box of a tower surmounted by a bulbous copper dome (with an advertisement statue on the top), the whole about as undesirable an intrusion into an Edinburgh street as could well be designed.

AS electrical work is becoming every year of more importance, we may draw attention to the prospectus of the "Electrical Standardising, Testing, and Training Institution," at Faraday House, Charing Cross-road, the object of which, in addition to the testing and standardising of electrical instruments, is to give a thorough theoretical and practical training to students of electrical engineering. The training given is a continuation of the college and the workshop system, on which subject we may quote the following remarks from the prospectus:—

"The workshop system, which is a survival of the old practice of apprenticeship, consists of placing a youth with a firm of manufacturing or contracting engineers, and allowing him to work side by side with the ordinary workman. Such a course unquestionably gives him an insight into working details that can be obtained in no other way, and when he finishes his work-course, he ought to have acquired a practical knowledge that at once enables him to earn a salary as a superior workman. Before, however, he can hope to fill higher positions, he must supplement the practical experience gained in the works by the acquisition of that theoretical knowledge which forms the basis of all modern engineering, and especially of electrical engineering.

The college system, on the other hand, consists in attendance upon lectures delivered by professional electrical engineers, and in the application to work, in the college laboratories and workshops, of the pure theory so taught. The objection to such a system, as usually conducted, is this: the college workshops are never quite like real workshops where serious work has to be done, nor is the college engine room like an electricity works. The result is that, however excellently a mere college or engineering school may be conducted, the student sooner or later has to supplement the theoretical knowledge there gained by a more or less lengthy service as an improver with an engineering firm, or at an electricity works. In each system the defect is that of incompleteness, and an efficient training is only to be obtained by a proper combination of the two."

In order to combine the two systems, the Institution has put itself in relation with certain leading firms dealing in electrical supply and manufacture, so that the theoretical knowledge gained at the Institution can be applied in the workshops, while the students have further the opportunity of insight into the work carried out in the testing and standardising departments of the Institution. The lecturer on electrical engineering and on electricity and magnetism is Mr. H. Erat Harrison, whose knowledge and ability in treating his subject are well known.

IT seems that electric workmen are going to display just the same folly and ignorance of their business as we have so frequently met with among gasmen, who are supposed to know all about gas, and who will go with a lighted candle to look for a leak in a room full of gas. An inquest has just been held on an unfortunate and silly man in the employ of the House-to-House Electric Lighting Company, who was working on a cable carrying a powerful current, without the precaution of wearing his insulating gloves, which he had been warned not to work without. He was killed, and we commented on a similar case not long since; but we have no doubt there will be a good many more. It seems impossible to get the average workman to understand that a danger does not cease to be a danger because it is in connexion with his daily occupation.

HERE is a specimen of the wisdom of one of those Admirable Crichtons,—those great authorities on all things mundane and extra-mundane, the London correspondents of the provincial journals:—

"The Royal Institute of British Architects met on Monday night in London, and congratulated themselves upon their meeting. They tell us that knowledge of perspective and firmness of touch are the chief pride of modern architectural draughtsmanship, features that the old builders were innocent of. Well, this may be true of our best men in the profession, but taking any large town street by street there is little to boast of in the generality of cases. Nine villas out of ten are barbarisms, and few public buildings are a safe for weak eyes. 'I speak as a fool,' but though it may be true that

'To build, to build, it is the noblest art of all,' what, I ask, of the jerry-builder and the average Corporation contract?"

This is the sort of stuff that passes for, and is accepted by the public as, "smart writing." We cannot correct the writer's estimate of himself,—he should be the best authority on that point,—nor can we, unhappily, controvert his assertion that "nine villas out of ten are barbarisms;" but we may enlighten his ignorance somewhat by informing him that "nine villas out of ten are barbarisms" because architects are not responsible for their design and erection; that architects do not work with "jerry" builders; and that if "the average Corporation contract" is not carried out as it should be, it is due partly to want of adequate supervision by the Corporation's officers, and partly to the penny-wise and pound-foolish parsimony of the "average Corporation,"—a policy which is too often aided and abetted by the average journalist to curry favour with the average ratepayer. It is needless to add that the President's remarks about modern architectural drawing were really in deprecation of the too great tendency in these days to rely on tricks of effect in drawing rather than on design in the true sense; but the whole passage is one bundle of ignorance. It might be as well if editors of provincial papers instructed their London correspondents to confine themselves to subjects they understood; only their letters would be so very short in that case.

BRICK BRIDGES IN PERSIA.

LIVING in England, where the art of road-making has attained so high a degree of perfection since the days of Macadam, it is difficult to realise that there are still countries, like Persia, where the whole of the traffic is conducted without the aid of wheeled vehicles of any description whatever. The great trade routes throughout Persia at the present day are simply tracks produced by the constant passing and re-passing of long strings of camels or mules carrying hales of merchandise over mountain passes and across barren deserts. In a dry climate the services of the engineer may be dispensed with for improving the roads without any very serious inconvenience to the inhabitants if they are accustomed to riding and transporting their goods and chattels by means of pack-saddles; but the crossing of rivers with strong currents is so formidable an obstacle to easy locomotion that the aid of the

engineer must needs be invoked. This, perhaps, explains the curious anomaly that in Persia the art of bridge-building should be so far in advance of the art of road-making. Thus the principal highway in northern Persia,—from Resht, on the Caspian Sea, to Teheran, the capital,—is a mere trackway, but it possesses at least four brick bridges of considerable size.

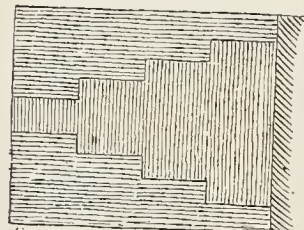
The distance from Resht to Teheran is about 200 miles. The first portion of the road from Resht follows the valley of the Sefid Rūd (or White River) in a southerly direction as far as Menjil, where the river divides into two branches, one going north-west in the direction of Tabriz, and the other, called the Shah Rūd, going south-east towards Teheran. At Menjil the road turns, and after following the Shah Rūd as far as Patchinar, commences to ascend the Kharzin Pass over the Elburz range of mountains. Having crossed the summit level it descends towards Kasvin, situated in the great high plateau of Persia, the average level of which is 4,000 ft. above the sea. The remainder of the road from Kasvin to Teheran is along the plains at the foot of the Elburz Mountains.

The bridges are as follows: (1) over the Shah Rūd (or Black River), a tributary of the Sefid Rūd, into which it runs on the west side, between Resht and Menjil,—a single-pointed arch; (2) over the Sefid Rūd at Menjil,—seven pointed arches of unequal spans; (3) over the Shah Rūd near Patchinar,—four pointed arches, two large and two small spans; and (4) over the Kāredj River, which runs down from the Elburz Mountains between Kasvin and Teheran, and disappears in a gravelly plain.

Of the latter, a measured drawing is given on the previous page, with details of its construction, as being perhaps the best typical specimen of those mentioned.

The Kāredj is a rapid mountain torrent with precipitous rocky banks on each side. The bridge has two spans of 23 ft. and 72 ft. 9 in. respectively, the width of the central pier being 31 ft. 4½ in. The level of the top of the parapet above the water is 42 ft., and the level of the point of the arch of the larger span above the springing is 35 ft. The width of the bridge across the outside of the parapets is 30 ft., and the width of the roadway 26 ft. The size of the bricks of which the bridge is built is 10 in. by 10 in. by 2½ in. Twenty-four courses in height measure 6 ft. 2 in., the mortar joints being about ⅜ in. thick. The thinnest part of the arch in the middle is three bricks, or 2 ft. 6 in., thick. It increases to five bricks, or 4 ft. 4 in. further on, and is nine bricks, or 7 ft. 6 in., next the abutments. The weight on the haunches of the arch is relieved by making three hollow cells or chambers, 4 ft. 9 in. wide and 12 ft. high, with pointed barrel vaulting beneath the roadway. The portion of the bridge over the abutment is also made hollow, there being a pointed barrel vault at the bottom going right through, and forming the floor of a chamber above. This chamber appears to be intended to be used for a temporary living-room for travellers. It is lighted by three windows at each end, and communicates with the cells above the haunches of the arch by an opening 4 ft. 6 in. high. The inner room is probably intended to afford sleeping accommodation. The living-room is approached by a staircase in the thickness of the wall leading up from the top of the pier. The Persian name for an upper chamber of this kind is "hala-khana," literally "a house up above."

The arrangement of the courses of bricks, as seen on the soffit of the arch when looking



Arrangement of Bricks, as seen on Underside of Arch.

upwards from below, is shown on the above sketch.

It will be observed that the courses go in

two directions, one parallel to the central axis of the bridge and the other at right-angles to it. This indicates the Persian method of constructing a brick arch, the chief object of which is to dispense as much as possible with a heavy centring in a country where timber is difficult to obtain and transport. The plan generally adopted is to set up a light centring, trussed so as to be sufficiently strong to support its own weight and a few rings of brickwork. After a single rib of bricks has been formed other bricks are dabbled against the first set, more being added next the abutment than in the centre of the arch. The arch thus becomes self-supporting as the work goes on, like a cantilever bridge, and when the span has been completely covered over in the middle, the remaining courses at each side are completed with bricks facing in a direction at right-angles to the former.

The mortar used for building in Persia is chiefly plaster of Paris called "getch." It is mixed in shallow wooden sancers by boys, who hand it to the bricklayers without the aid of a trowel. The whole time the operation of building is going on a monotonous chant is kept up by the workmen, the words being as follows:—

"Ajour bédé ajour."—A brick, give me a brick.
 "Getché bédé getché"—Mortar, give me mortar.
 "Getché bédé hé mán"—Mortar give to me.
 "Digger ykéé digger"—More, one more.

And so on with endless variations.

It is not easy to fix a date for any of the bridges in Persia in the present state of our knowledge, though very possibly historical documents exist at Teheran or elsewhere that would throw light on the subject.

THE SURVEYORS' INSTITUTION:

PRESIDENT'S ADDRESS.

MR. C. J. SHOPPEE, F.R.I.B.A., President of the Surveyors' Institution, in the course of his inaugural address, delivered on Monday evening, dealt first of all with the question of town holdings, and then proceeded to speak of the proposed codification and amendment of the existing Metropolitan Building Acts and proposed street improvements in the following terms:—

The Metropolitan Building Acts.

"In common with the other bodies interested in this subject, the Council of the Institution availed themselves of the invitation of the late President of the Local Government Board to formulate their views on the subject, using as a basis the draft Consolidation Bill prepared by the Department, I presume as a *corpus vile* on which to operate.

The Council were not able to adopt some of the suggestions introduced in the Government Bill from existing Acts, but, with the assistance of a powerful Committee, were enabled to submit a large number of new proposals for the amendment of the details of the Bill. Among the general suggestions put forward by our Council were the following:—

1. The Council are not in possession of the reasons of the Local Government Board for confining the Consolidation Bill entirely to Acts relating to building construction and the strong reasons thereto, and, unless there are of opinion that such provisions in the existing Acts as relate to street line and frontage questions, and such portions of the provisions of the Public Health Act as relate to house drains, and all sanitary questions within the curtilage of the building, should be incorporated in the Consolidation Act, and that all these matters should be placed under the supervision of the District Surveyor.

2. It is most desirable that the present duality of authority with reference to the many incidents of a building should be got rid of, and that only one application and the consent of one authority should in future be necessary, thus avoiding the vexation, delay, and expense attending the present system.

3. The Council of the Institution are of opinion that, where an application for any special permission is made to the London County Council or to a local authority, the Act should require the decision to be given within a reasonable time, and where application is refused that the grounds of disapproval should be stated.

4. In all cases in which the London County Council or the Superintending Architect have a discretionary power, an appeal shall lie to the

Tribunal of Arbitration constituted under the 85th section of the Act.

5. Further, the Tribunal of Arbitration should, in the opinion of the Council of the Surveyors' Institution, be invested with power to dispense in special cases with a literal compliance with the Constructive Clauses of the Act.

Whether, and if so to what extent, our recommendations will commend themselves to the authorities remains to be seen. As a purely departmental matter, without any conceivable political significance, it is to be earnestly hoped that the change of Government will not put an end to this very necessary movement for bringing our London Building Law into harmony with itself and with modern requirements. Those of us whose practice lies much in this direction are familiar with the tiresome uncertainty and the vexatious delays which result from the present confused state of the law, to say nothing of the jumble of jurisdictions; and it is to be hoped, now that the Local Government Board are in possession of the well-considered views of all the bodies practically identified with building operations in London, that a real effort will be made next Session to pass a general Building Act of some description."

The Proposed Street from Holborn to the Strand.

"Public improvements in London having of recent years become identified with proposals which go to the foundation of our system of local taxation, have been practically at a standstill since the London County Council have taken the reins of government into their hands. Their predecessors, it is computed, spent during thirty-three years an average sum of 500,000 a year on work of this character, while the County Council in the three years of its existence have spent only a little more than 289,000, in all on new street improvements. Unless the new Parliament is more compliant than the old one, matters are likely to remain at a deadlock, the London County Council having decided, in words somewhat lacking in grammatical precision, that they will not proceed with any new scheme 'falling provision by Parliament for some equitable division of the net cost of the improvement between the owners of ground values and the occupiers thereof.'

We have all studied with interest the scheme for a great thoroughfare, 100 ft. wide, between Holborn and the Strand. The objects of the scheme were stated by the County Council to be as follows:—

(a) To combine a first-class thoroughfare from Holborn to the Strand with the widening of Holywell-street and St. Mary-le-Strand.

(b) To open a direct thoroughfare from the north to the Strand, Fleet-street, and Temple Bar, going eastwards, as well as for the traffic towards the Strand, Wellington-street, and Waterloo Bridge, westwards.

(c) To improve the communication between the Covent Garden and Long Acre District and the Lincoln's Inn District.

(d) To open and improve one of the most insanitary and decaying quarters of London.

(e) To offer an opportunity for a central and commanding site for a new County Hall.

In the abstract, all will agree that a new first-class north and south thoroughfare is needed, and that the Strand should be widened by the removal of the block of buildings between Holywell-street and the main thoroughfare. We shall also, probably, be agreed that it is desirable to improve the communication between Covent Garden and Long Acre and Lincoln's Inn Fields, and that the reconstruction of the miserable district about Clare Market is in itself an object well worthy the attention of the County Council. It is not, however, clear to my mind, at any rate, that the improvement of this squalid district need be associated with the scheme for dealing with the vast commercial traffic north and south, and for relieving the congested condition of the Strand; nor am I satisfied that the new street, either as regards the position selected, or its general conception, will have much effect beyond providing a noble vista at the cost of intensifying existing evils. The authors of it appear to have been influenced unduly by the desire to use the Church of St. Mary-le-Strand as an architectural termination to the new thoroughfare, and they are accordingly in some danger of subordinating practical to æsthetic considerations.

I cannot help thinking that the main principle to be kept in view is, not to bring fresh traffic into the Strand, but to draw as much of it as possible on to the Thames Embankment, which is now most imperfectly utilised; and

for this reason I think it would be a much better plan to construct a low-level street from the foot of Surrey-street to a point about midway on the western side of Lincoln's Inn Fields, and thence by a street trending north-westwards to the north end of Little Queen-street, Holborn. The new street I propose would pass on the level from the Embankment to the northern side of the Strand, at a depth of 23 ft. below that thoroughfare, which would be carried across it by means of a bridge; thence, for about 1,350 ft., at an easy gradient of about 1 in 30, to the level of the existing roadway on the western side of Lincoln's Inn Fields. The Waterloo Bridge traffic would be provided for by a spur street on the site of Clare-street, Blackmore-street, and White Hart-street, in much the same way as is suggested in the plan of the London County Council.

Nothing, in my opinion, could be more undesirable than concentrating the immense traffic which now finds its way north and south, by a multitude of routes, upon one point, and that one of the least convenient in the already overcrowded Strand. I have examined the levels, and am satisfied that the low-level street I have suggested is practicable, and that no heavier gradient would be involved than those existing in the case of similar streets constructed in recent years in other parts of London. My plan would involve the taking of the whole block of buildings on the west side of Surrey-street, but would save the taking of the larger block between the proposed Circus in the London County Council plan and Holborn. On the other hand, it would necessitate the appropriation of the forecourts of the houses on the west side of Lincoln's Inn Fields. I know that this particular area, and that of New Inn, is somewhat sacrosanct in the eyes of the County Council, though I have a shrewd suspicion that the loss of area for recompense by adopting the line through Lincoln's Inn Fields has quite as much to do with their aversion to that route as fear of a powerful opposition from the legal interest.

Since the foregoing paragraphs were written I learn that a modified plan has been put forward in lieu of that referred to. I have considered it, as well as the proposals of my friend Sir Whitaker Ellis, but I am still of opinion that the low-level street offers the best solution of the problem.

The London County Council as Contractor.

After dealing with the question of "betterment," strongly criticising the proposals of the London County Council on the score of their impracticability, the President referred to the Council's recent determination to become "its own builder" as follows:—

"I am afraid the present pace of the London County Council is a little trying to the nerves of many persons. We have all been somewhat startled at their latest departure in determining to do away with the contractor and become their own builders. Even the placid optimism of Sir John Lubbock was ruffled by this proposal, which any practical man will feel contains the germs of infinite trouble and risk to all concerned. I suppose it is part of the crusade of the modern *doctrinaires* against the person he is pleased to call the 'middleman,' which means in plain English every man except himself. It is impossible that a course of this kind taken by such a large potential employer of labour as the London County Council, with its particular relations to the working-class population, can have other than serious effects in raising the general standard of wages. But this is not all, or by any means the worst of it, for the evil will be intensified by the absence of the competitive element which tends to neutralise the normal ascent of wages by the improvement and the cheapening of processes, and by the devising and introduction of labour-saving appliances. Nor is even this all, for the present system of contracting ensures a careful supervision over the details of expenditure, and provides a person of means against whom a claim will lie for bad or for faulty or inadequate work. Who is to take the place of this person under the new arrangement? Are the workmen to be individually sued and compelled to make good defective work at their own expense, or is the County Council to become the middleman in place of the contractor, with this difference, that whereas the ordinary contractor is in a position of pecuniary responsibility to his employer, the new middleman (the County Council) is to be in a position of pecuniary responsibility to no

one, whatever may be the general responsibility to the employer, the ratepayer? The modern cant about the middleman is, apparently, about to be put to a practical test, though it should be evident enough to men of common sense that he is a necessary link in the long chain of production and distribution. There is prevalent a confusion of thought between what are known as 'rings' (of which labour organisations, by the way, are a conspicuous example) and the intermediaries who exercise a natural and legitimate function in organising the application of labour to the needs of the community, and, by taking upon themselves the risk, define the extent of the client's outlay. Every objection that has been urged against the exercise of direct or indirect political influence on workmen by their employer is true in a tenfold degree when for the private employer is substituted a body elected under a popular franchise,—with this difference, that the pressure is not in this case from above, but from below.

There has been nothing in the past to prevent private clients from dispensing with the services of a contractor save the general conviction that by his capital, plant, skill, and accumulated experience, he performs useful functions in relation to operations lying outside the sphere of lay knowledge. The contractor, therefore, is no marauder 'gathering where he has not straw,' but a person evolved out of the necessities and conveniences of civilised life."

After dealing with a variety of other topics, the President concluded by referring to the present position of the Institution, which in point of numbers and in other respects seems to be very satisfactory.

THE INSTITUTION OF CIVIL ENGINEERS: PRESIDENT'S ADDRESS.

At the first meeting for the Session 1892-93, held on Tuesday, the 8th inst., Mr. Harrison Bayter, the President, delivered his inaugural address on assuming the chair for the first time since his election. Premising that he proposed to make a departure from established custom in not dealing with past achievements, but with future prospects, the President proceeded to consider some engineering works of importance that would likely have to be undertaken in the not distant future by British engineers.

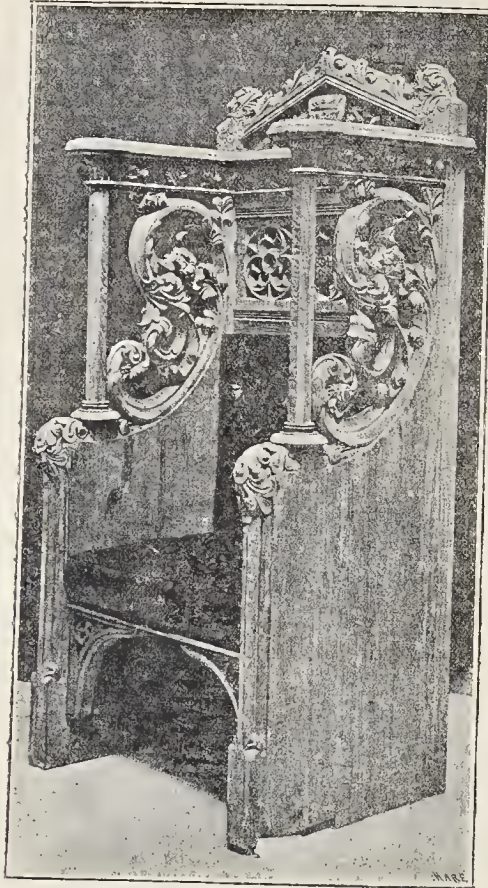
It was held by some that in the United Kingdom finally in respect of the creation of new undertakings had been almost reached. The consolidation, however, of existing works into large systems, and the consequent reduction of the rates of working expenses, enabled the corporate bodies to which they belonged to raise money at such easy rates that it became possible to construct works which had formerly appeared prohibitive on account of their magnitude and cost. Examples of such developments actually existing were cited, and reference was made to others which appeared to be rapidly achieving the condition of practical undertakings. Among them was the submarine tunnel between England and France. The President had been associated with the late Sir John Hawkshaw throughout the latter's long connexion with this project, and gave an account of the present state of the question, intimating that, in his opinion, apart from political considerations, a tunnel was perfectly feasible, and would probably cost less than one-fifth the amount necessary for a bridge. Another great project which had received considerable attention, and was likely to receive more, was the tunnel proposed for uniting the railways of England and Scotland with those of Ireland. Several routes crossing the North Channel between Wigtownshire and the Irish coast had at different times been suggested. Some of the lines proposed, would, however, cross the ravine in the sea-bed known as "Beaufort's Dyke," which was at places three miles wide, and had a maximum depth of water of 900 ft. The project favoured by the President was the one due to Mr. James Barton, M.Inst.C.E., described in a paper read before the Society of Arts by Sir Roper Lethbridge, K.C.I.E. In this case the tunnel would pass round the northern end of Beaufort's Dyke, at such a depth that no part would be nearer the head of the sea than 150 ft. The geological features had been investigated by Professor Hull, F.R.S., whose conclusions had been confirmed by Mr. Topley, F.R.S., abowing that the tunnel would pass for one-third of its length through the

lower Silurian Rocks, and for the remaining distance through the Red Marls and New Red Sandstone. Other subaqueous tunnels, connecting the railways north and south of the Humber, under the Thames at Purfleet, and under the Solent to connect the railways of the Isle of Wight with those of the mainland, were referred to as likely to be undertaken in the not distant future. The successful accomplishment in twelve months of the tunnel under the St. Clair River, on the Grand Trunk Railway of Canada, had shown how these works could be speedily and cheaply carried out.

The President next considered the future of the canals and inland waterways of this country, of which there were 3,314 miles in more or less active operation. The importance of canals might be judged from evidence given before Sir Thomas Scott's Parliamentary Committee of 1883, to the effect that the average cost of canals in England and Wales was 3,350l. against that of railways 46,000l.; the cost of maintenance of works less than one-fourth that of railways, while the cost of conveyance of heavy materials was less than one-third that of like service on railways. The neglect of canals was a matter of the most serious interest for this country, as it enabled its competitors in France, Belgium, and Holland, which countries possessed well-devised canal systems, to carry coal and heavy goods at such low rates as to greatly favour foreign competition with our own industries. It was unfortunate that exceptional difficulties had beset the construction of the Manchester Ship Canal, which might tend to retard the accomplishment of similar enterprises. Nevertheless, the President believed that the next fifty years would witness such a development of canal and river navigation as would be a fruitful source of occupation for the British engineer. Much yet remained to be done to place our harbour and dock accommodation on a satisfactory footing. The direction which developments might profitably take were discussed, and the President thought that the check under which dock enterprise was suffering was of a temporary nature only, and not due to circumstances likely to impede future dock-extension.

The President then proceeded to notice some works abroad that the British engineer might probably be called upon to undertake. Of these, one, if not the greatest, was the Euphrates Valley Railway. The length of the line from the Mediterranean Port to the Persian Gulf would be about 850 miles, and it would cost 8,500,000l., or 10,000l. a mile on an average. The Ismid and Angora Railway, now being constructed by the Germans in Asia Minor, under conditions not very dissimilar to those of the Euphrates Valley line, had previously been tendered for by responsible British contractors, at the rate of 5,000l. a mile, so that the estimate of 10,000l. seemed not unreasonable. With reference to the urgent necessity for this railway, the opinion of Viscount Wolesey was quoted to the effect that the Suez Canal might be quickly and easily destroyed, and that "it would be perfectly ridiculous for us to depend on the Suez Canal as a line of communication with our Eastern possessions in time of war." The question had now become almost dormant in this country, but it should be so no longer, for there was danger that the work which should be undertaken by England as a political necessity, might be, and, in fact, was now partly being accomplished by others, and a note of warning might not be inappropriate. But there was another matter to be considered, rendering the engineering possession of the territory still more necessary to our country. This was the possible construction of a Euphrates Valley Navigation. Looking at the whole question in a practical light, there was no doubt that the construction of a railway from the Mediterranean *via* the Euphrates Valley to the Persian Gulf was necessary and urgent if we were to have this route to India in our own hands.

The President concluded by referring to the works which would still give employment to the British engineer in Asia, South and Central America, and Mexico, and in Africa, particularly Egypt, where, however, the undertakings he cited could never be realised were the country left to itself. Only those who knew what Egypt was before the British occupation could appreciate the significance of the present beneficent control. If that control were removed or weakened, Egypt would soon again become the miserable and unhappy country it was under the old régime.



Mayor's Chair: designed for the Corporation of Deal by Mr. H. P. Burke Downing.

THE MAYOR'S CHAIR FOR THE CORPORATION OF DEAL.

THIS chair forms the central portion of the new Corporation pew in St. George's Church, Deal; as the illustration is from a photograph taken in the workshop of the sculptor, the remainder of the work does not appear here. The pew for the members of the Corporation extends right and left of it, the back and ends being similarly richly carved in oak. The architect is Mr. H. P. Burke Downing, of London. The design gives room in the head of the chair for the ancient arms of the Corporation, but contains no other symbols. The carving of the chair has been executed by Mr. Hitch, of Vauxhall, who has well succeeded in bringing out the spirit of the design. Mr. Jas. J. Wise, of Deal, was the contractor for the general work of which this forms a part.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

THIS Commission resumed its inquiry on Tuesday last, with the intention of sitting for four consecutive days.* The first witnesses called were the analytical experts put forward by the Companies who take their water from the rivers; and the earlier names on the list were those of Dr. Odling, Mr. Wm. Crookes, Professor W. R. Smith, Professor Ray Lankester, and Dr. Klein. The general effect of the evidence of the first three witnesses was that the pollution of the rivers was neutralised by great dilution, subsidence in flow, oxidation, the action of

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 19, 23, 47, 71, 82, 103, 126, 298, 316, 333, 353, 375.

animal and vegetable life, and filtration; that, in case any pathological microbes (cholera or typhoid, the only two diseases known to be communicable by water) should reach the Thames (in which they have never yet been found) from the area above the intakes, the chances of their surviving natural processes in the stream and sand filtration in sufficient numbers to injure any consumer of the water were almost inexpressibly infinitesimal; that the analyses of the water of the rivers which justified these conclusions were supported by the behaviour of microbes produced by cultivation and subjected in the laboratory to conditions analogous to those that prevail in the rivers; and that therefore the rivers, excluding the first water brought down by floods, would furnish excellent water for storage to increase the total supply. The evidence of Dr. Odling covered the whole field, and he insisted successively upon the following points:—

Statistical.—1. The low death-rates of London; and its low and steadily decreasing death-rate from zymotic and especially typhoid disease. 2. The non-influence of outbreaks of typhoid or other zymotic disease in the upper-river towns and districts on the corresponding death-rates of London. 3. The non-occurrence of any local or general outbreak of typhoid or other zymotic disease in London traceable to or even attributed to the water. This substantial identity in zymotic sources. 4. Especially typhoid death-rate of different metropolitan districts supplied respectively with river water, and with water from deep wells. 5. The great extent of reduction now effected, and almost entire cessation likely to be effected in the discharge of untreated sewage and such-like matter into the rivers, more especially in the case of the excretal matter of persons suffering from typhoid, cholera, or choleraic diarrhoea. 6. The extreme dilution, and reduction to an almost infinitesimal

proportion, of whatever amount of sewage or of like matter that still finds its way into the river.

Chemical.—7. The smallness of the proportion of organic matter present in the London water supply, both absolutely and relatively to the proportion present in other town supplies; the average amount but little over a quarter of a grain per gallon, or about one part in 300,000. 8. The absence of any increase in the proportion of organic matter present in the water at Thanet, Ditton, over and above that present in the water some hundred miles higher up at Lechlade. 9. The fully aerated state of the river-supply in London, and the generally recognised power of well-aerated water to keep itself sweet, or effect its own purification by a process of oxidation—exceptional views of some chemists on this point notwithstanding. 10. The recognised continual alternate transformation by natural processes of sweet into foul and of foul into sweet matter, and, regards river-water, the non-persistence of a small proportion of foul matter discharged into the river in its original condition of foul matter. The presumably innocuous quality of the usual small proportion of organic matter present in the London river-water, and the little import for the most part of the variations met with in the proportion present. The almost continuous diminution, moreover, in successive years, of the average proportion present.

Bacteriological.—12. The presence of bacilli and microbes everywhere, and the important agricultural and purifying actions exerted directly or indirectly by certain classes of microbes. The presumably abundant charging of even sterilised water with bacilli, in its passage from the laboratory to the stomach. 13. The non-recognition of pathogenic microbes in London river-water, and strong presumption as to the inability of any such microbes, if finding their way in the water, to maintain their activity or even their existence therein. 14. The observed non-development and even speedy destruction of certain of such microbes, introduced purposely by way of experiment into river-water, partly by the absence of the conditions for their sustenance, and partly by their competition with the microbes proper to the water. 15. The necessarily almost infinite dilution or diution, and thereby reduced or destroyed potency of any pathogenic microbes, supposing them to find their way into the water and to escape speedy destruction therein. 16. The recognised innocuousness or powerlessness of pathogenic microbes, when ingested in comparatively small number, to produce disease, presumably by reason of their competition with other micro-organisms or quasi-organisms, as the leucocytes of the blood. 17. The recognised effect of filtration, as practised by the companies, in abstracting microbe life from the water, and so reducing any risk of infection to an infinitesimal minimum.

Mr. Crookes, with the object of allaying the apprehensions that had been raised by the evidence about microbes in water, produced a statement of the numbers of bacteria that had been found in air, in the soil, in aerated waters, in milk, in meat, in flour, in cheese, and in butter. In a cubic metre of air there are from 200 on the summit of the Pantheon in Paris, to 165,000 in a badly-ventilated room, and there are many millions in small quantities of their edibles named. In the face of these appalling numbers, Mr. Crookes says, the ten to twenty bacteria per cubic centimetre in London water are insignificant, and may be regarded as a proof of supreme purity. It is a question whether deep well water is any better for being free from them, and it speedily becomes charged with them on being exposed to the air.

ON THE APPLICATION OF AN ARCHITECTURAL EDUCATION.*

LET me give you a little illustration of this. I was once engaged on a large public building, and the work had so far advanced that we had come to the staircase. It was a big one, and capable of being made a grand architectural feature. You will often find that your best opportunities for applying your art is in the interior of your building, and you will have to make the opportunities for yourself; they will seldom be offered to you. To carry out my idea I asked for some 15,000l. or 20,000l. to make it a marble staircase. This was staunchly opposed by some, on the ground of cost. "It is quite unnecessary," said they; "a good, easy, stone stair, with a handsome cast-iron railing and plaster walls is all that is required, and will look vastly handsome and spacious. What do you want with marble steps and balustrade, and marble columns and walls and floor? It is extravagance and waste." Well, I

* By Mr. William Young, F.R.I.B.A., being the concluding portion of a paper read before the Architectural Association on the 4th inst. (See p. 379, ante.)





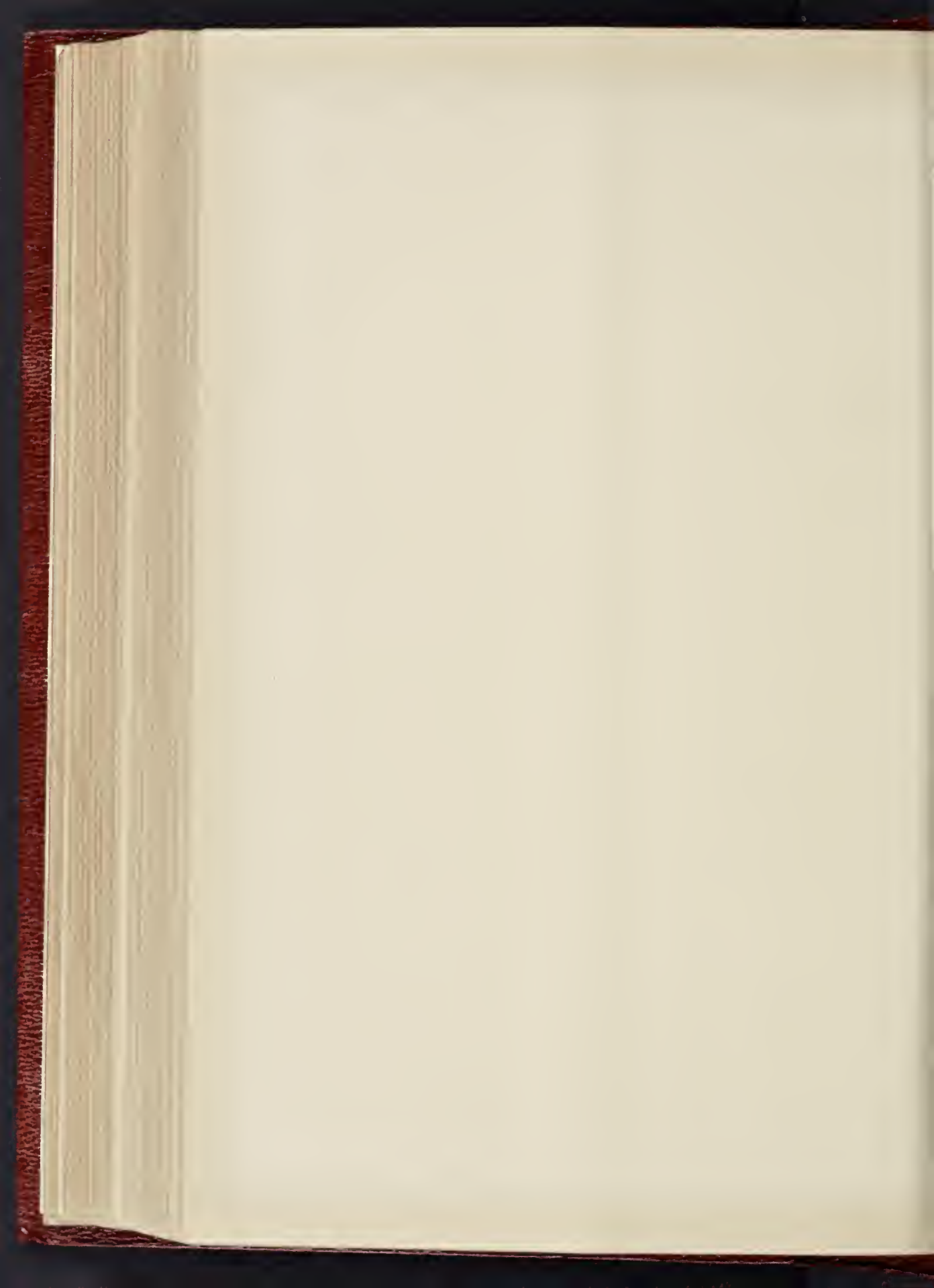
THE PANTHEON

(See the lead)



INK PHOTO SPRADUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE, E.C.

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not what I wanted, and in time the staircase was completed,—and done in a way and at a cost far beyond anything the committee had ever seen or contemplated having. Soon after the work was completed I was present one evening at a reception, and met one of the leading opponents to the work, a staunch economist, on that very staircase. He came up to me with much friendly enthusiasm. "Mr. Young," he said, "this is grand. I had no idea you intended giving us anything like this, or I should not have opposed it for a moment. We are all proud of it, every category is proud of it, and not one penny of the cost is grudged." In this instance the people got what they wanted, not what they asked for; and I have no doubt that they would have been quite satisfied, and found no fault with me, if they had got instead the stone staircase, with the cast-iron railing.

Your first work you may regard as the foundation-stone of your future success. If it is well designed and well carried out,—the one will be of no use without the other,—it will bring you another, and the next may bring you two, and so on. If your first work be not a success you will have missed one of your best opportunities. How are you to make it a success? My advice is first of all let your design be thoroughly practical. We live in an age when the practical is put before everything, and is better understood and appreciated than the artistic. Notwithstanding this you should try and be something more than only practical.

Try and infuse something of the spirit of art into your work; for there is no doubt that such work is appreciated by some people when it is done, and will tell in your favour. There is a kind of erroneous notion abroad at present that if an architect is practical he is not artistic; and that if he is artistic, he is not practical. Let your work show that you are both practical and artistic. A man may be thoroughly practical, and with all his efforts he may not be able to put any artistic feeling into his work. It is no fault of his. But if you have the gift of artistic conception, it is entirely your own fault if you are not practical, for practical knowledge may be acquired,—partly in the class-room, but more in the office and the workshop, and mostly on buildings in progress. It is this combination of the practical man and the artist that will make your work a success.

A mere builder may put up a building which is sound in construction, and which may even possess the element of utility, although devoid of anything pleasing, interesting, or beautiful, if it is not actually unsightly. An architect,—if he is an architect in the true sense,—will, with the same materials and the same amount of labour, and, therefore, at the same cost, arrange his plan and construction so as to make the building interesting, pleasing, and beautiful, while at the same time it has all the elements of utility and stability. He simply adds to the bricks and mortar, and stone and labour, what Sir Joshua Reynolds mixed with his colours. "Brains, Sir."

Besides knowing everything about good and bad materials, and good and bad workmanship, your client will expect you to know all about the proper cost of his work,—and it is reasonable that he should do so. An architect should always know what his work should cost, and his estimate must be very loose indeed if he cannot find a first-class builder to do the work at his estimate. Sometimes even surveyors may go wrong, and it may be necessary for you to look after them. I remember a case, some years ago, when I had a mansoleum to build. It was a small thing, a Greek cross on a plan, with a dome, and all in stone. The estimate came in about 4,000*l.*, which was much more than it ought to have been. I looked at the prices, they were not unreasonable. I, at last, got the total amount of stone in the estimate, which seemed enormous. The fault was here. So I sat down with the surveyor and went through every stone. I happened to be quite as well up in masonry as the surveyor, and the result of this was that the estimate was brought down to something like 3,000*l.* without altering the design in any way, and the work was done.

It is not interesting work, but your clients will, above all things, expect you to look after the cost of things, and advise if it be fair or not. You should have an eye to this in your education. I think myself that estimates and accounts are the *bête noir* of an architect's life. They hamper you with your designs when you are

doing the work, and they come back to you when the work is done and you want to forget all about it. But nevertheless you will find it much to your advantage to be well up in the cost of things.

"Keep within your estimates" was the advice given to me when I was commencing practice by an architect who was doing a large amount of work; "that," he said, "is the way I got on. I got a name for always keeping within my estimate, and clients came to me on that account." It was excellent advice, and I pass it on to you. Years afterwards, in conversation with one of the most eminent civil engineers of the day on this same subject, he said: "If we want an extra 100,000*l.* for structural purposes we get it, for no company would take the risk of failure, after the request." That was also a useful hint, and I pass it on to you. On no account avoid asking for an extra if it is necessary for foundations or any structural purpose.

But, apart from all this, there are times when an architect is building for the future, as well as for the present, when cost must be a secondary consideration, when the first and only duty is to do the work thoroughly well. This occurs mostly in large public buildings, but also sometimes in large private buildings. Such opportunities are not to be missed or misused by questions of cost. You may save a few thousands, and spoil your work, and the generations who come after, and who have to pay their share of the cost, will blame you for not doing the best. Cost is only a question or a grumble of a day or a year; good work is appreciated for ever.

When we look at St. Paul's or Westminster Abbey, or any of the great buildings of the past or the present, we are filled with pleasure and admiration for the work, but we care not one jot whether the architect kept within his estimate or not. If Sir Christopher Wren had lowered his dome 100 ft., or omitted one of his western towers in order to reduce the cost, would we praise him for his economy, or blame him for spoiling his work? Something like this was done in a large Government building in Parliament-street, called the Home Office. I am sure it was not Sir Gilbert Scott's fault that his design was not fully carried out, and that the uncompleted corners, where cupolas were intended, are due probably to the straitened circumstances of the National purse. The Nation spends so many millions in other ways,—rails which are never laid, for instance,—that we could not afford the few thousands necessary to complete a Government building in one of the leading thoroughfares of London.

An architect is never at his best until he is designing for the future, putting his thoughts into stone to pass down to future generations, just as an author puts his thoughts in a book, or a painter on canvas. If such opportunities come in your way, you must rise to them, and to a large extent you must make them for yourself, for if the opportunity does come, it will assuredly be hampered by economics and otherwise, and it will depend on your own individually whether the opportunity is a big success or a failure.

As well as being a servant of the British public, a true architect is also a servant,—he should be a disciple,—of the great art of architecture, which is neither English nor French, neither German nor Greek. It belongs to all countries and to all ages. It is neither Classic, nor Gothic, nor good Queen Anne, but all of them, and much more. Its aim and mission is a large one. It is not to put up a beautiful building here and there, but to make every building beautiful, both without and within, and to make all the surroundings of life beautiful. Why should not every building in every street be beautiful, and the streets and the squares themselves be made beautiful and pleasant places? It is not an impossible idea; it is not even an extravagant one; and in time I believe it will be done. It would do more to make people happy than an eight hours' day, and it is quite as attainable.

Apply your architectural education to bring about this end, not only by putting up good buildings, but by your influence, becoming in a way missionaries of your art, to teach people to love the beautiful, and create a demand for it. This is another way of serving the British public.

In all your work take Utility for your friend, and Practical Knowledge for your companion, but let the Beautiful be your only love. With

the triple association, your work will serve all the useful purposes for which they are intended, and they will possess all the elements of stability and endurance, and, being pervaded with the highest quality, the beautiful will appear in them everywhere. Take with you to light you in the way of practice all the seven lamps of architecture. Take the Lamp of Sacrifice, the Lamp of Truth, the Lamp of Power, the Lamp of Beauty, the Lamp of Life, the Lamp of Memory, and the Lamp of Obedience.

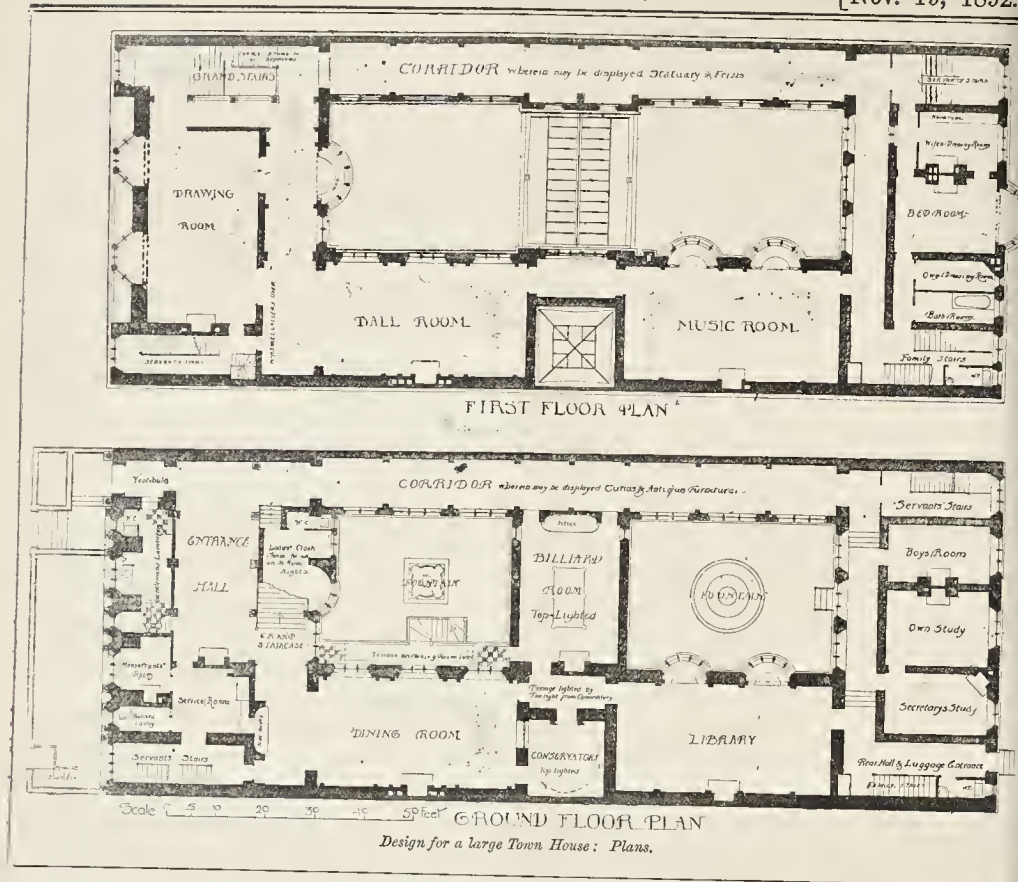
But I am going, as a practical architect, to suggest to you a new lamp, which has served me, and will probably help you on your way,—the Lamp of Enthusiasm.

Older and perhaps wiser men will say,—"No, no; don't recommend these young men enthusiasm, give them rather perseverance." Well, perseverance is a very good thing, and indispensable, but perseverance is cold and enthusiasm is greater, for it is perseverance with love added, and you will do no good work without love for your work. Perseverance may make a surveyor,—but it takes enthusiasm to make an architect.

Light up the seven lamps to guide you with your work, but illuminate your drawing-board and your mind with the light of enthusiasm. It will help you over difficulties, and will sustain you in days of doubt and depression, which come to all men, and especially to men of artistic temperament.

If I were asked to put in one sentence,—one that you may remember when you have forgotten all else I have said to you to-night,—how best to apply your architectural education, I would say,—"Preserve your enthusiasm for your Art. By this means you will best apply your architectural education; by this means you may advance the architecture of the day in which you live, and by this means you may be enabled to add your own contributions to the architectural monuments of the world."

The President having invited discussion, Mr. E. W. Mountford, in moving a vote of thanks to Mr. Young for his paper, said that with regard to competitions, he had had some little experience of them, and his opinion was that if young architects went into competitions carefully and enthusiastically, they could not do very wrong. That was only his opinion, and, of course, it might be a prejudiced one. When architects began practice, as a rule they had a great deal of spare time, and they might as well be trying their hands in making sets of competition drawings as sitting still doing nothing. Even if they were not successful in winning a competition, the experience that was to be obtained in making a set of competition drawings for any building could not be very useful to them in after life when they did get some work to do; for if they went into a competition properly they must go and see other buildings, and study books bearing on buildings of the kind which were the subject of their design. No doubt, as Mr. Young had said, there must be a great deal of money lost to the architectural body as a whole by competitions, on account of the large number of designs sent in,—a number which was often altogether out of proportion to the cost of the building; but if one went to look at those designs, it would be found that out of all the drawings sent in, 75 per cent. of them had not the least chance of winning; they were so badly made; so altogether ill-considered, and so utterly feeble in every way, that one could only wonder that the authors had had the assurance to send them in. The only satisfaction was that making the drawings had been good practice for them. If they went on making competition drawings, in time they would learn to make a decent design. Of course, as Mr. Young had said, those who went in for competitions often had to contend against all sorts of local influences, which made the chances of success very much less; but he (the speaker), taking things all round at the present time, was not sure that there was very much to complain of in that respect. In these days, when professional referees were the fashion, even if the decisions were not always all that could be desired by every competitor, still the awards were made with perfect honesty and good faith. Of course there were now and then flagrant instances of local prejudice, an instance of which had occurred lately in the case of a well-known town-hall in Wales, where the first premiated design was thrown over in favour of one by a local man, who undertook to do it at 1 per cent. commission,—but even that was not



in England. One point which ought to be carefully adhered to, in his opinion, by all who sent in competition designs, was to have a thoroughly reliable estimate made of the cost of their designs before sending them in.

Mr. J. M. Brydon, in seconding the vote of thanks, said he thought the Association was to be congratulated on having had such a practical paper from Mr. Young. There had been a great deal of discussion of late as to whether architecture was an art or a profession, but evidently it was also a business, and Mr. Young had been preaching to them the doctrine of the business of architecture that evening. There were one or two points which struck him in the course of the paper. There was no doubt a great deal in what Mr. Young had said as to the exercise of tact and judgment in dealing with one's clients; but one very great difficulty at all. As to competitions, there was no doubt whatever that they had now become a matter of necessity; for any one who had any ambition to do public work there was no other way to get it but by competition. It might be regarded as to some extent a regrettable state of things that the most eminent men of the profession were not given the public work to carry out, and that it was put up to competition, so that it just became a mere matter of chance whether a good or a bad design was obtained. He quite agreed with Mr. Montford that even if one did not win, one was repaid for his trouble by the experience gained in thinking out and making a set of drawings. There was no doubt that when they were young they were all to be found in the 75 per cent. of competitors whose designs had no chance of winning. If they went into a competition for a special class of building, it was an essential condition of success, or of even approximating to success, that they should know their subject thoroughly. He was inclined to think, with the previous speaker, that local influence was not so rampant as it was formerly. Although the professional referee was not infallible, his introduction

into competition was a great improvement on the practice which formerly prevailed. It was to be hoped that as the practice of employing referees extended, they would be more alive to their duties, and that specialists would be selected for special work. In conclusion, Mr. Brydon said he had great belief in Mr. Young's eighth lamp, the Lamp of Enthusiasm. Without enthusiasm no good architecture was ever done. It was the enthusiasm of youth which enabled them to overcome the uphill work at the beginning. Without enthusiasm they would never have any art. As Mr. Young had said, perseverance might make a surveyor; but enthusiasm was necessary to make an architect.

Mr. Sydney Vacher, in supporting the vote of thanks, said with regard to competitions that they had done a great deal for English architecture. They had enabled many young men to rise to a position which they would not otherwise have attained for many years.

Mr. E. S. Gale said that the paper had been a most instructive and suggestive one. The question of competitions was a very important one, and they had very few opportunities of discussing it. As one who had seen a good many competition designs, one thing that had struck him was that the value of a good plan would always tell. He had noticed that a good many elevations which were second-rate were recommended by referees merely because they had special merit in planning.

The President, having made a few remarks, put the vote of thanks to the meeting, which was carried unanimously, and Mr. Young having briefly replied, the meeting terminated.

REBODOS, TINGEWICK CHURCH, BUCKS.—On the 6th inst. the Bishop of Reading dedicated a new rebodos, which has been erected in the Church of St. Mary, Tingewick, near Buckingham. The rebodos, which is carved in oak, has been executed by Mr. Harcourt Runnacles, of Halstead, from the designs of Mr. A. Plomfield Jackson, architect, London.

Illustrations.

THE PANTHEON, ROME.

AS the important discovery in regard to the probable date of the Rotunda of the Pantheon is discussed in our leading article this week, we have thought it would be of interest to our readers to have the representation of the building before them, in order to compare it with the remarks in the article.*

DESIGN FOR A LARGE TOWN HOUSE.

This design was sent in competition for the Gold Medal of the Royal Academy of Arts last autumn. It was stated in the conditions that the plan was to be arranged with a view to the display of pictures and statuary, but that there was to be no picture-gallery. Through the kindness of the late Mr. Edwin Long, R.A., the intending competitors were invited to his house at Hampstead, where he would have shown them his arrangements for hanging pictures, and explained his views on planning. His death, however, intervened before his kind project could be carried out. Some of the competitors were thus working somewhat in the dark as to what was actually required in planning a house of this sort. The successful design was published in the *Builder* shortly after the award of the Gold Medal.†

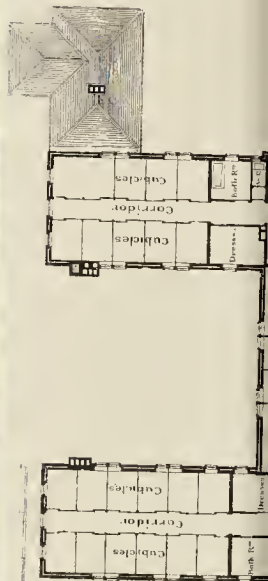
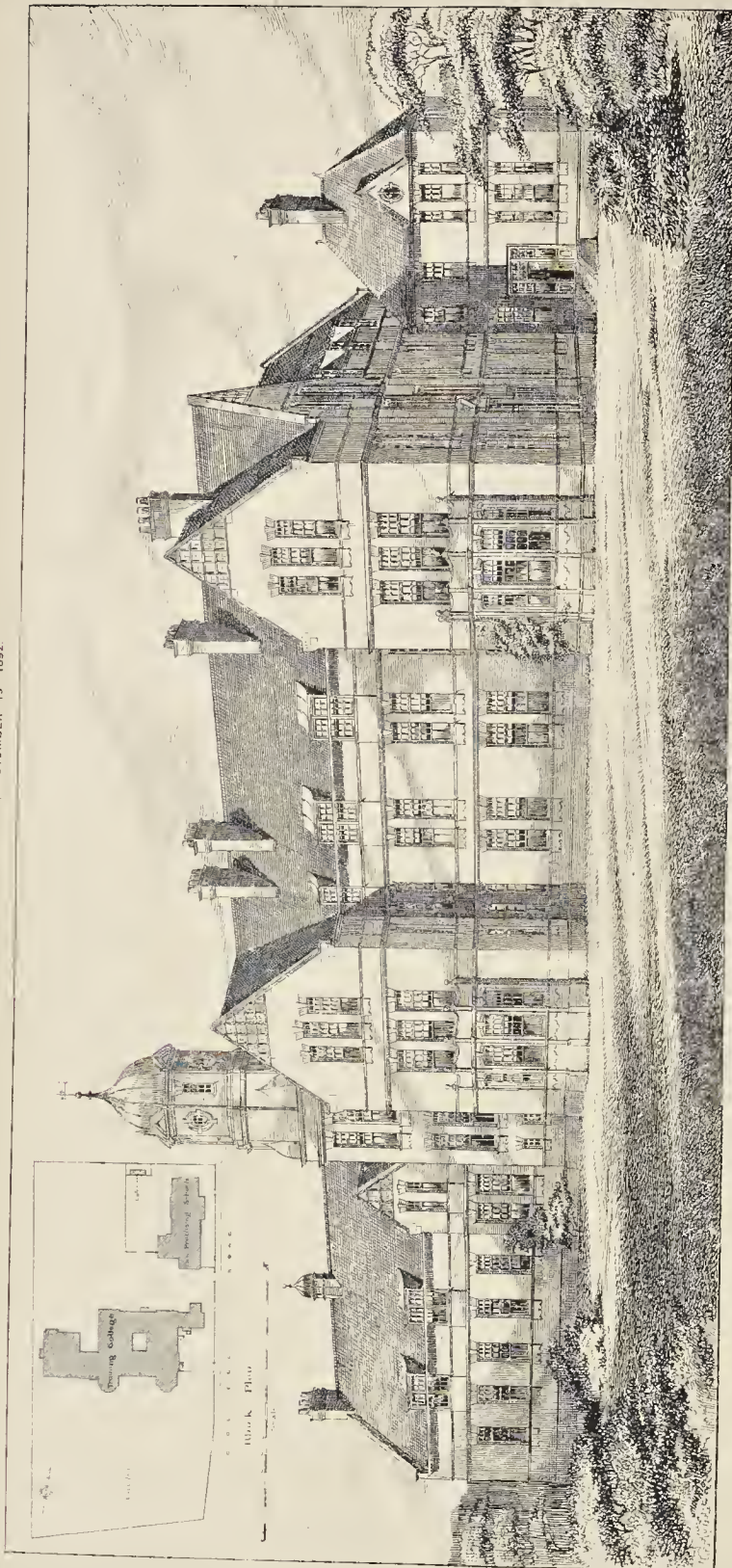
In the design here illustrated probably the principal mistake is in making the walls opposite the light the principal ones for displaying pictures, instead of those at right-angles to it. A good room has also been sacrificed on the ground floor in order to get the gentlemen's cloak-room and lavatory and the men-servants' room near to the entrance.

The site is an unusual one—70 ft. frontage by

* It is our usual rule, in making use of a photograph, to give the name of the photographer, in order to credit him with his work; we regret that we are unable to do so in this case, not having any means of ascertaining it. † See *Builder* for January 23, 1892.



THE BUILDER, NOVEMBER 19 1892.

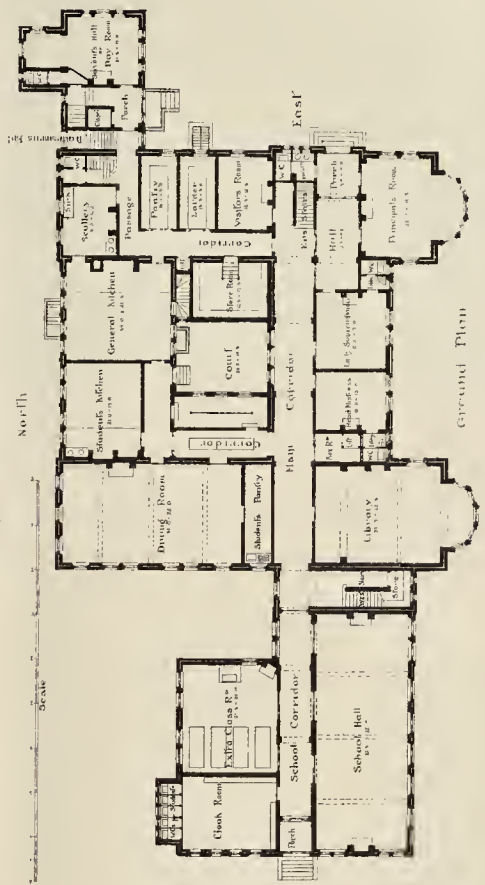


Scale 1/4" = 10'

Second Floor Plan

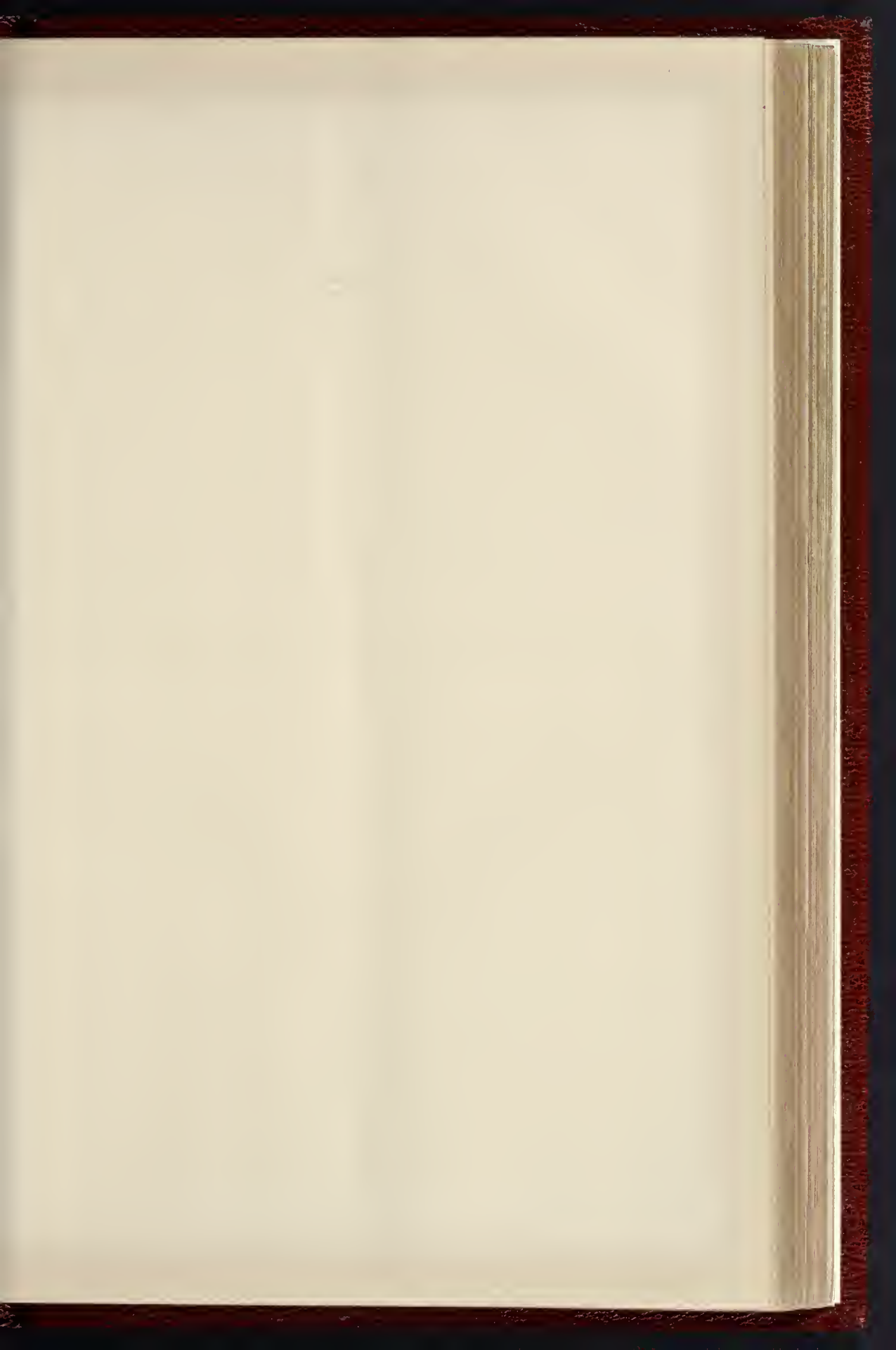


First Floor Plan

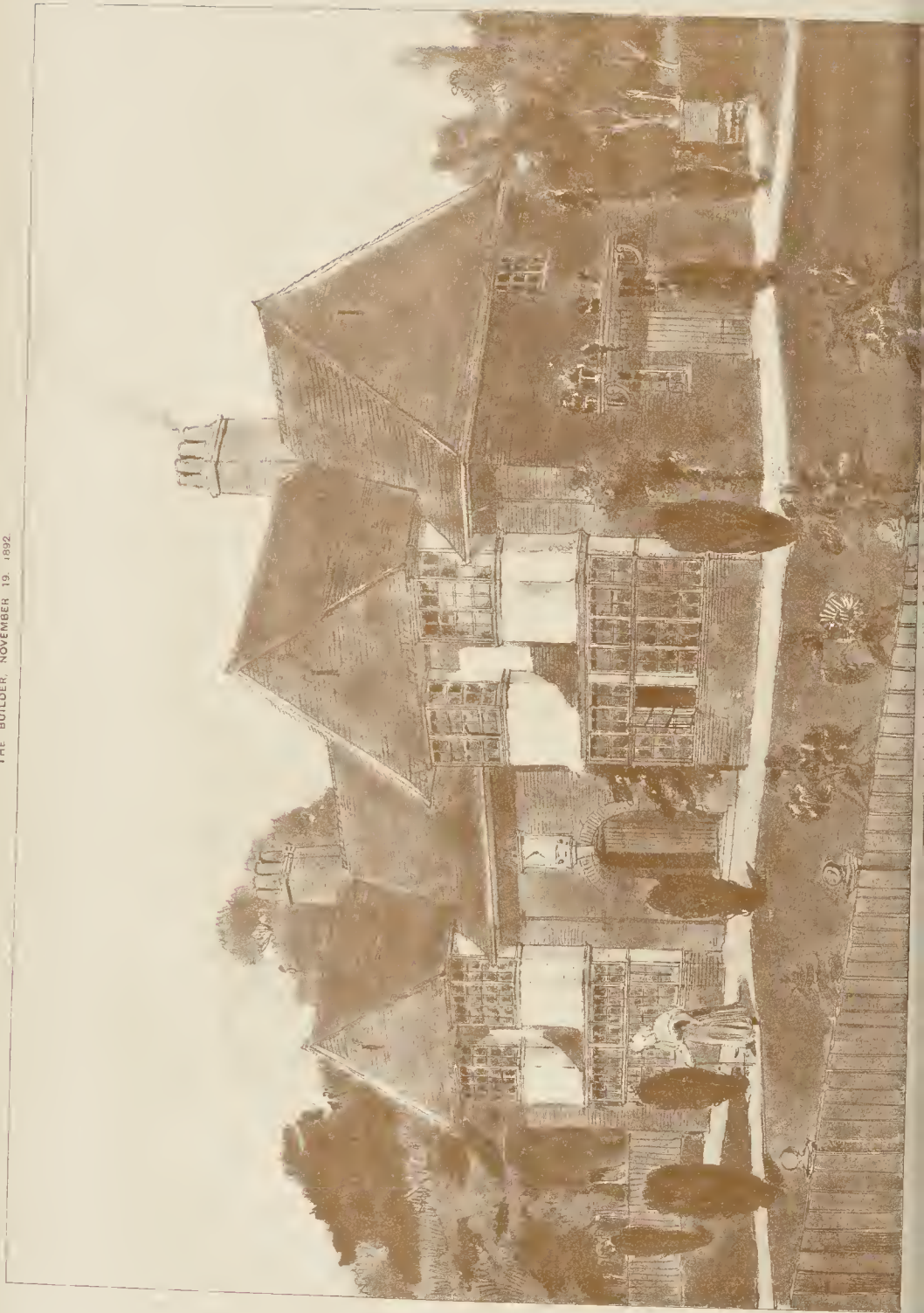


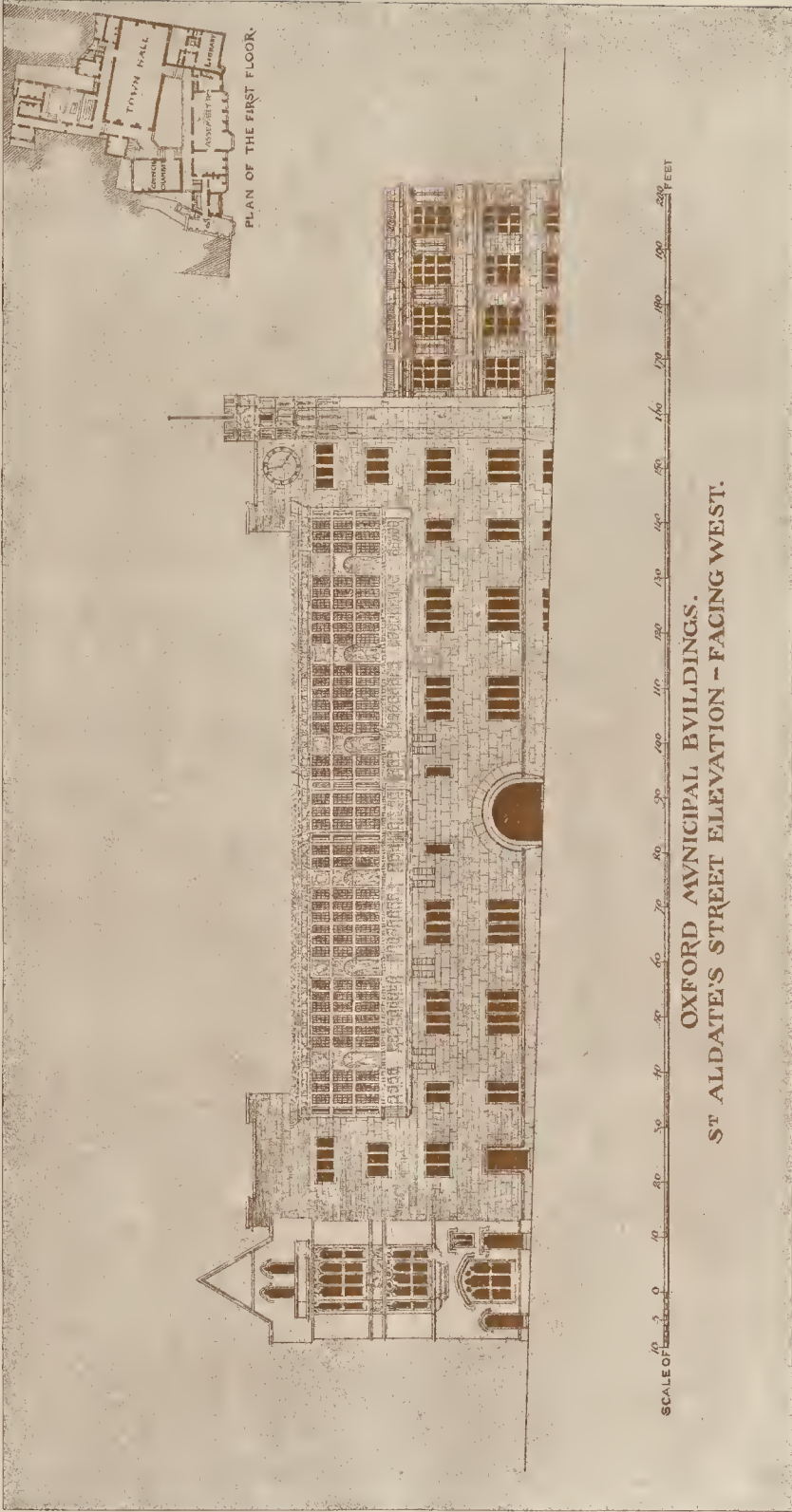
PROJ. LINDS BRADSHAW & CO. 412 EAST WASHINGTON STREET, PITTSBURGH, PA.

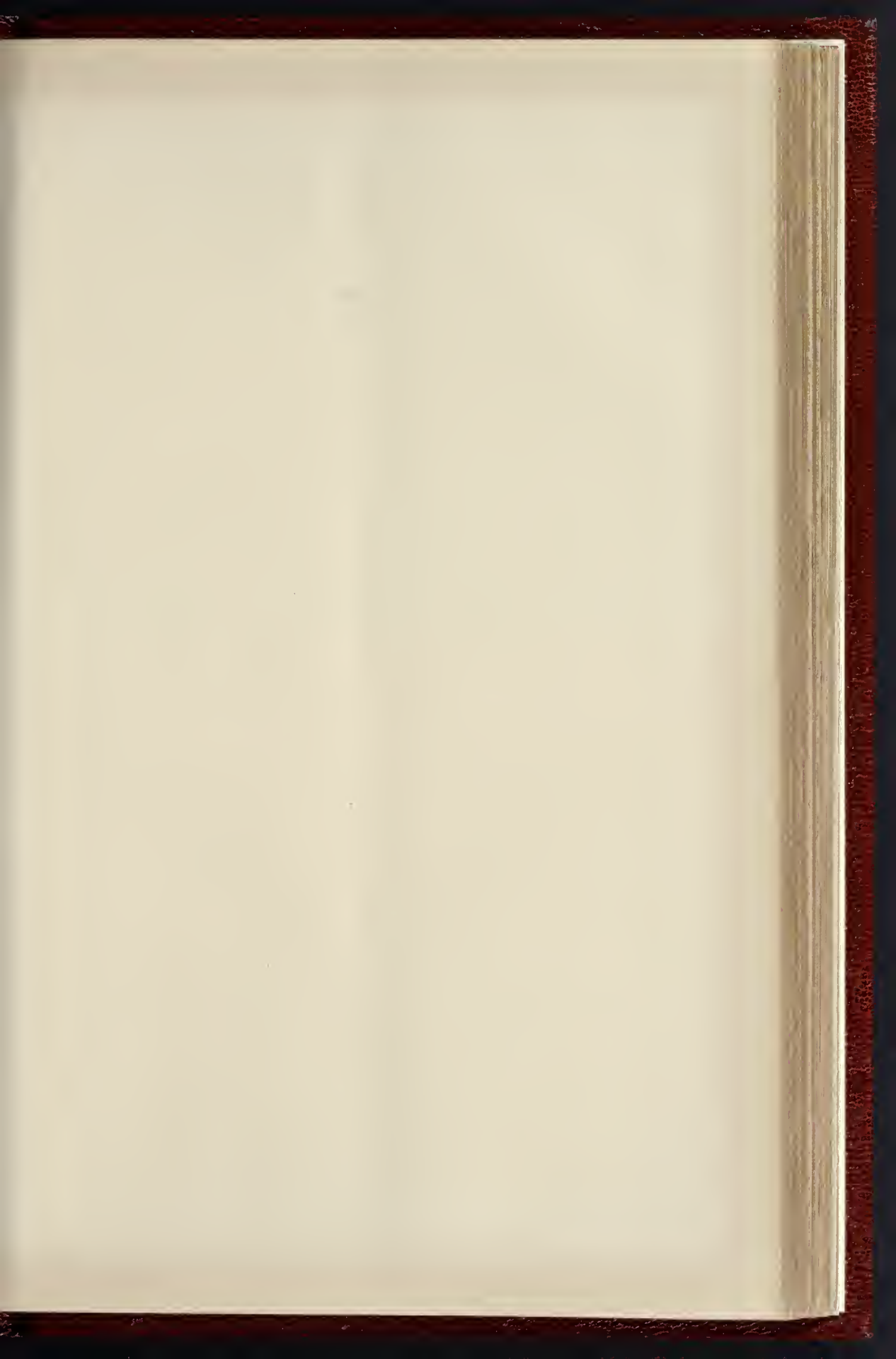
NEW TRAINING COLLEGE, NORWICH: VIEW FROM SOUTH EAST.—MESSRS. OLIVER & LEESON, ARCHITECTS.



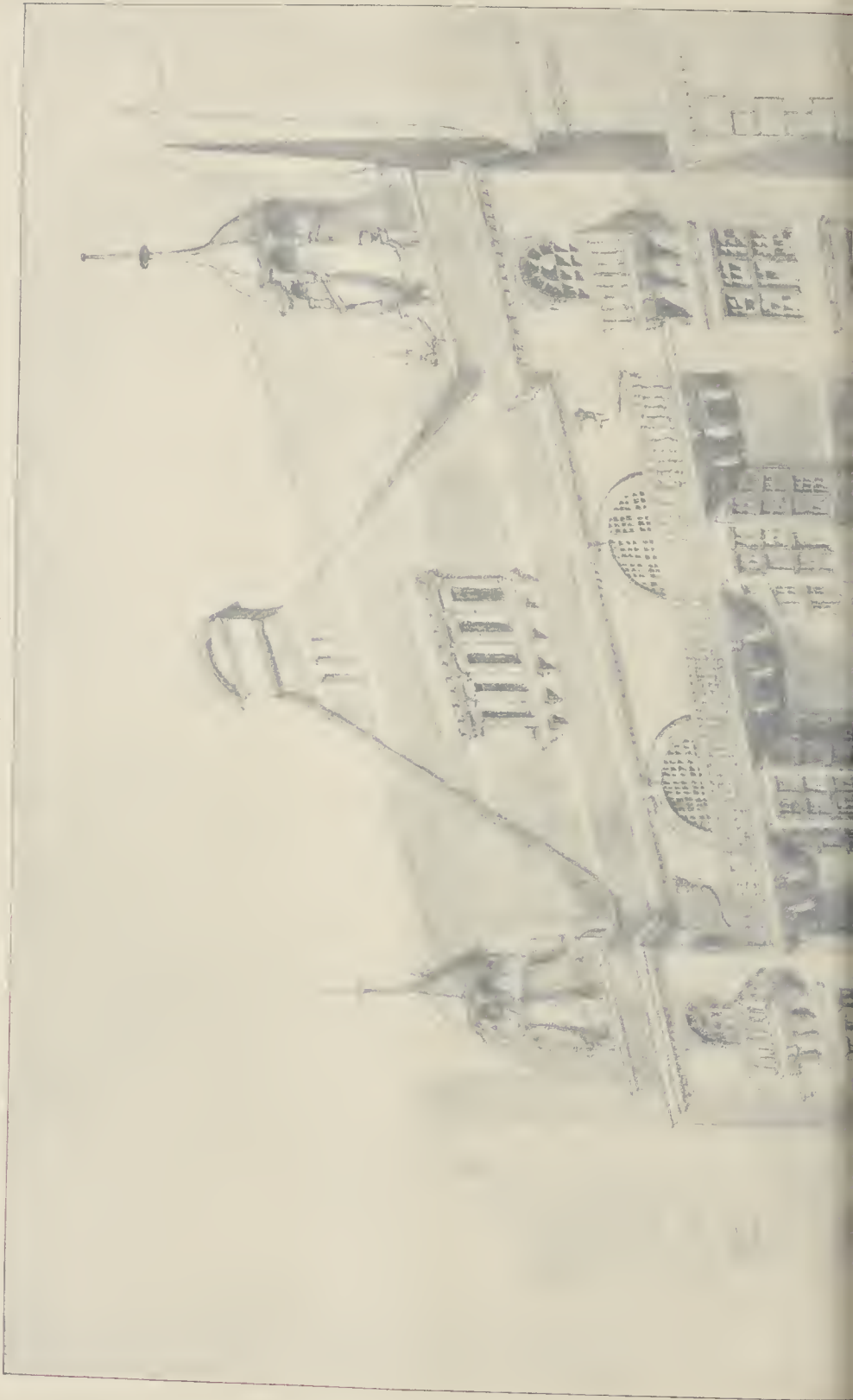
THE BUILDER, NOVEMBER 19, 1892







THE BUILDER, NOVEMBER 19, 1892





NEW PHOTO BRADSHAW & CO. 115 EAST WASHINGTON STREET, NEW YORK, N.Y.

DESIGN FOR A TOWN HOUSE.—By MR. ARTHUR BARILETT, A.R.I.B.A.

Royal Academy Exhibition, 1892.

200 ft. in depth. The author therefore presumed that the house would abut on to a street at the back, and made a luggage and private entrance that way. The grand staircase to the first floor is 10 ft. wide, and a considerable feature is made of the long corridors on the ground and first floor, which are ceiled with a wooden vault. In the perspective the point of sight is one which would be possible in an ordinary London street.

The proposed material of the elevations is Bath stone and brick, with Whitland Abbey green slate roof. A. B.

NEW TRAINING COLLEGE, NORWICH.

The Norwich and Ely Diocesan Training College, of which we publish a view and plans this week, was opened on September 1. The cost of the college is about 10,000*l.*, and of the practising schools about 2,122*l.*, or a little over 12,000*l.* in all, which is exclusive of the amount to be expended in furnishing and laying out the grounds. The building has been carried out from the designs and under the superintendence of Messrs. Oliver & Leeson, architects, Newcastle-on-Tyne. The walls are of red brick with moulded brick bands, and the roof is covered with grey slates.

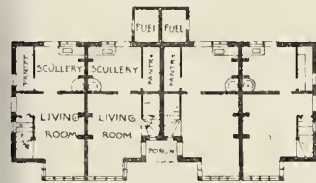
The plans show the arrangement of the building, which is considered by the officials of the Education Department as a very satisfactory example of its class.

The whole of the building, including the cubicles, is heated with hot water, and has been ventilated and arranged as to sanitation in a manner approved by the Medical Officer and the City Engineer. Especial care has been taken in regard to the drainage and supply, and no pains have been spared to get it a perfect model of what such an institution should be. Messrs. Barnard, Bishops, & Barnard have supplied the stoves and heating-apparatus; the lifts have been fitted by Messrs. Waygood & Co., of London; and the corridors and stairs have been laid in fireproof material by Messrs. W. B. Wilkinson & Co., of London and Newcastle. The builders are Messrs. J. Young & Son, of Norwich; Mr. J. Bayes acted as clerk of the works.

The architects wish it to be understood that in the original design the sick rooms were in a separate block completely isolated from the main building, and that they were put in their present position on the advice of Mr. Christian, who acted as assessor, and in opposition to the wishes of the architects.

VILLAGE ALMSHOUSES.

This is a block of four small cottages, each containing a living-room, scullery, larder, and fuel store, with two bedrooms over, and an earth-closet in the rear. The walls are to be



Plan of Almshouses.

of brickwork, the gables and roof tiled, the unglazed parts of the front bay windows rough-cast.

The architect is Mr. C. E. Ponting, and the drawing was exhibited in the last Royal Academy exhibition.

DESIGN FOR OXFORD MUNICIPAL BUILDINGS.

This small and characteristic elevation was submitted by Mr. Halsey Ricardo in the sketch competition for the Oxford Municipal Buildings. The original drawing is executed in white touches on a dark paper, for reasons given by Mr. Ricardo below; the effect can only be partially realised in the lithograph. The drawing was exhibited at the Royal Academy of this year. In regard to his intention in the design the architect writes—

"While trying to reproduce something of the Medieval flavour that hangs round Oxford, my aim was to cast my design in a 'civic,' as contrasted with an 'academic' mould. Since the

building will have no connexion with the University, and as the new frontage will have to stand the comparison challenged by the Christchurch front a little lower down the street, it seemed to me that the very broadest treatment was one's only hope of escaping from such challenge with architectural self-respect.

The conditions, which denied us the use of colour or shade, and commanded the one-sixteenth scale, left me, I thought, no better way of presenting my design than as a white mass on a dark background; the alternative, a dark mass on white paper, could only mislead."

ELECTRIC LIGHTING AT THE GUILDHALL.

On Wednesday, November 16, we had the opportunity of inspecting Messrs. Lund Bros. & Co.'s installation of the electric light at the Guildhall.

The current is supplied on the three-wire system by the City of London Electric Lighting Company at a pressure slightly exceeding 100 volts.

The main switchboard is situated in the basement; the switches are bandsomely mounted on it, and are arranged to break the three circuits simultaneously. On the same board two ammeters and a voltmeter are mounted, and it is interesting to note that the former read *virtual* amperes, showing that our protest of last year against the Board of Trade definition of the "alternating current ampere" has not been without effect in the commercial world. The fuses are of copper wire. Owing in part to the treble break, and in part to the subdivision of the current, these main switches are lighter in construction, easier to handle, and more elegant in appearance than is usually the case.

In the large hall there are fourteen pendant electroliers, each carrying thirty-six lamps, of which twenty-four are of 16 candle-power, and the other twelve of 8 candle-power each. There are also additional lights in the roof and in under the band-gallery.

The lobby is illuminated with nineteen 25 candle-power lamps, for which the former gas-fittings have been adapted.

The Council-room is lighted with 137 lamps, for the most part of 25-candle-power. Seventy-eight of these are grouped in the large central electrolier, viz., sixty of 25-candle-power and eighteen of 16-candle-power; others are collected in two clusters on each side of the chair, and distributed in the galleries and corridor.

The switch-boards for the various groups are placed in moulded frames, which much improves their appearance; and the fuses are of a novel design, with spring contacts, so that they can be instantly removed and replaced. It is proposed to have telephonic communication between the various switchboards.

The library is provided with fourteen hanging lights, each containing three 32-candle-power lamps, and two rows each of twenty-eight 16-candle-power lamps near the roof, besides twelve lamps of 32-candle-power in the recesses. The light is not unpleasantly low, and is abundant in quantity, but the arrangement is less artistic than that in other parts of the building, and it will, probably, be subsequently modified. In the reading-room there are sixteen lamps suspended, each of 16-candle-power.

The installation has been recently finished, and has not yet been subjected to the official electrical tests; but it has given full satisfaction on every occasion on which it has been used, including the Lord Mayor's Banquet on the 9th inst. It is one of the few electrical installations that have been completed in the time contracted for.

The cables used have an insulation resistance of 750 megohms per mile, and the wood-casing used to conceal the wires is nonobtrusive, and in harmony with its surroundings.

THE HAMBRO' SYNAGOGUE.—This synagogue, standing on the east side of Church-row, Fenchurch-street, was finally closed, after celebration of a valedictory service, on the evening of the 9th inst. Moses (or Mordecai) Hamburger built it in 1736, in the garden of his house, at what was then Magpye alley, and it is believed to be the oldest place of worship used by German Jews, or followers of the Ashkenazi formularies, in London. The congregation will be provided with another synagogue eastwards. The present freehold site of about 3,500 ft. superficial is to be let on building lease for a term of eighty years.

ARCHITECTURAL SOCIETIES.

ARCHITECTURAL SECTION OF THE GLASGOW PHILOSOPHICAL SOCIETY.—The opening meeting of the present session of the Architectural Section of the Philosophical Society of Glasgow was held on the 14th inst. in the rooms, 207, Bath-street. Mr. Campbell Douglas, F.R.I.B.A., the President, delivered the presidential address. He remarked that he had the honour of appearing before the Section on that occasion in a somewhat unique position. This was the third time that he had had the honour of being elected President. It had been customary to review the subjects of interest common to their profession and the public, and he remembered how some time was spent lately by Mr. Thomson, the late President, in considering suggestions for the improvement of the proposed site of the new Art Galleries. Since then that matter had all been settled. There had been two competitions,—the one open to all architects, and the second to the selected few. The matter had now been settled for good or for evil. Mr. Douglas afterwards proceeded to take a historical survey of the Society, and in the course of his address dealt with many points of interest to the members.

PICKING'S INTERLOCKING FIREPROOF CONSTRUCTION.

On Thursday, the 10th inst., a large party of gentlemen interested in fireproof construction accepted the invitation of the company formed for the purpose of putting the above system of fireproof construction before the public, to attend at the works at Bonnds-green, New Southgate, for the purpose of seeing the invention put to a practical test.

The form of construction adopted is that of hollow tubes of earthenware, each of which, in normal sizes, is 6 in. wide, and 2 ft. long, and divided by a central diaphragm. On the sides of the tubes are, alternately, inclusions and projections which furnish the interlocking arrangement that is the special point of the construction.

The underside of the tubes, when used for floors, and both sides when used for partitions are prepared with dovetailed grooves for supporting the plaster, and the system has therefore the advantage of rendering lathing unnecessary; while, as the tubes rest upon and cover the ironwork, no centring is required for the construction of a fireproof floor.

Before the actual testing, the party were conducted over the works and shown the various processes by which the tubes are prepared from the raw clay, by admixture with burnt clay ballast, pottery, &c., thoroughly ground together, and then forced through moulds by a special machine, from which it issues in the form of tubes. These are then carefully dried and burnt.

For the testing of the capabilities of the material and form of construction, small squares of the flooring had been put together and loaded so that the visitors actually saw a load of 3,125 lbs. on a 2 ft. square of the flooring without concrete, and one of 4,168 lbs. on a similar square with 1½ in. of concrete over the tubes. Other specimens were arranged in the form of partitions so as to show the capability of the invention for this purpose.

The test by fire was made in a small shed with sledge and roof constructed with the interlocking tubes, which successfully resisted a fierce combustion within, so that there can be no doubt that, in this invention, the company are offering a satisfactory method of fireproof construction, albeit somewhat closely resembling other methods already before the public.

COMPETITIONS.

ABERDARE INTERMEDIATE AND TECHNICAL SCHOOL.—In the above competition, in which the assessor was Mr. Ewan Christian, we are informed that the selected design was that submitted by Mr. J. H. Phillips, architect, of Cardiff, who has been appointed to carry out the work. The estimated cost is 3,800*l.*

"BLACK AND WHITE."—Mr. Henry Blackburn (of "Academy Notes" fame) has had open for the last ten months a studio at 123, Victoria-street, Westminster, for "instruction in drawing for the press." Wednesday is "visitors' day," on which any one can see the whole collection of black and white drawings on application to the secretary.

free from the manifold defects and imperfections attaching to all newly-established systems. Such denunciations can carry but little weight, though this assumed superiority to recognised methods may reflect a glamour of cynical and complacent contempt for such mundane teachings, which may weigh somewhat with those who do not care to look beneath the surface.

WILLIAM WHITE, F.S.A.

THE SOANE MUSEUM.

SIR,—I am sure that all who knew that accomplished and courteous architect and gentleman, Mr. Wild, will have heard with regret of his death; but I think the idea will have occurred to some that the necessity for appointing an successor may afford to the trustees an opportunity of reconsidering the whole position, and of seeing whether they cannot so discharge their trust as to make the contents of the museum of more public use; more accessible to the public, and more available to the student of architecture; and so follow the change which has come over Loudon since Sir John Soane's day.

The contents of the museum have no doubt been duly kept and cared for, and they have been shown in a way in accordance with Sir John Soane's desires,—namely in the house which he built for their reception and for his own residence. But is it not to be regretted that such a valuable—if not an invaluable,—national possession as a series of Hogarth's pictures, to speak of nothing else, should be exposed to the risk of fire and burglary incidental to their being shown in a dwelling-house not fireproof, and still occupied as such? If, too, the contents of the museum generally could be differently displayed it might be of much more service, as might the library.

The ideal treatment of the museum would be to abandon Lincoln's Inn-fields, to exhibit the architectural collection and house the library in the ground-floor galleries at Conduit-street, and to place the pictures in the National Gallery; and if the casts at the Architectural Museum could at the same time be moved to the same locality, namely Conduit-street, we should have a fine and instructive assemblage of objects of study brought together on the spot where they will be of most use.

Of course, there are legal and other difficulties to be overcome, but in the present day these constantly give way when some trust of old date has to be modified, in order to make the best use of the objects or the money which the trustees have to administer.

T. ROGER SMITH.

University College, London,
November 15.

SOME ANCIENT WALL-PAININGS.

SIR,—It may be interesting to your readers to see something about the ancient wall-paintings recently brought to light at St. Nicholas, Harbledown, the church of the leper's hospital near Canterbury. Immediate steps being decided on for the preservation of these paintings, the most important of many here that have been uncovered from their coating of whitewash, I have had an excellent opportunity of examining the works while treating them with a preservative solution, which has, as a first result, deepened and brightened the colours, enabling one with absolute certainty to decide the subject represented to be the Annunciation.

The two figures are on opposite spays of the east window, standing under ogee canopies, and painted in black and white on a dull red ground. Flesh and draperies are alike black outlined with white, exceedingly bold and simple, and bearing no little resemblance to a rubbing from a vigorous brass. The angel to the left of the window is slightly the smaller figure, and has one wing raised, crossing behind the white nimbus; the other wing is somewhat indefinite, but turned towards the edge of the spay. There is a blank space at the right wrist as it crosses the figure and onto of the upraised hand; this gap may indicate where once was the return of a scroll, possible traces of which occur depending by the side of the gathered robe, but there is no inscription visible to make the suggestion a certainty. The figure of the Virgin is as well-posed as the angel's; she clasps a book to her breast, and at her feet to the right is a vase of considerable size, one

handle forming a conspicuous element in the design. Although there is a blank space reaching to the Virgin's elbow, here a bud and open flower put an end to all doubt as to the vase or pot holding a lily. A little to the left of the nimbus, and as though coming from the window, is the Holy Spirit in the usual form of a dove.

It seems probable that these paintings were executed in the fourteenth century, possibly soon after the chancel was rebuilt, the west end of the church, it will be remembered, being generally Norman in style.

I may mention also that the doubt as to the subject on the south wall of the Church of St. Alphege, Canterbury, seems likely to be removed, for, on treating this painting with a preservative mixture—it having shown signs lately of rapid disintegration—details have appeared which indicate that it is not, as has been supposed, a subject connected with the histories of St. Etheldreda or St. Alphege, but simply a portion of an Adoration of the Magi. This work—possibly of the early fourteenth century—was of considerable area, and evidently extended over a portion of the wall now pierced with a window.

The mural paintings in the Eastbridge Hospital, representing portions of a martyrdom of Becket, Our Lord in Majesty, and the Last Supper, discovered behind and above the old fireplace in 1873, have suffered greatly from exposure to the air and moisture since their structural restoration by Mr. Neale. These works, which have been gradually but surely fading away, have had much of their early vigour restored to them by a similar treatment to those at St. Alphege and St. Nicholas.

PHILIP H. NEWMAN.

LONDON FOG.

SIR,—In your notice of an article on the above subject in the *National Review* you state that, whilst gas fires are to be approved for cooking purposes, they are not to be tolerated in lieu of the ordinary coal fire for warming our rooms. "It means giving up the most cheering indoor object in winter."

By my own experience I can assure you that you are mistaken. For long since I have looked upon it as the duty of all citizens to do their best to abate the evolution of smoke from their own fireplaces. I have tried many gas fires. Most of them are unsatisfactory, but their want of success is not a little to be attributed to the unsuitable grates in which the gas fires are placed.

Grates for burning coal are now better designed for that purpose than they were, but 50 per cent. of the grates used are little better than holes in the wall with coals smouldering in the hole.

To come to the gas fire, I have long since found that one of the best grates in the market is the "Marlborough" grate, made by Steel & Garland, good for coals or for gas. In this I have had placed Sagg's Charing Cross gas fire. In result I get a bright, clear cherry-red mass of radiant fuel, glowing with heat. It not only looks like, but it is as good as a glowing mass of coal, and costs 13d. an hour. There may be, and I hope there are, other fires as good; I only give you my experience after ten years of experiments.

Whatever joy some may find in poking a fire, the loss of it is more than counterbalanced by:—1. Entire absence of dirt. 2. Entire absence of smoke. 3. No chimney to sweep. 4. No coals to carry. 5. No fires to be made up, or to deceive you by going out when you want them to stop in. 6. The ability to have a good fire whenever you want it, and for as long as you want it,—no longer.

SOMERS CLARKE.

LOCAL CONTROL OVER DRAINAGE AND SANITARY WORK.

SIR,—A thorough reform in the Public Health Service of the United Kingdom is very desirable. I fully agree with one of your correspondents that it is impossible for a man to have a sound knowledge of "building construction," and also to be an expert judge of the characteristics of good and bad food.

A more perfect examination than that at present held by the Sanitary Institute for sanitary inspectors is a most urgent necessity. Persons of very defective general and technical education have recently

* That is not quite equivalent to saying they are not to be tolerated."—Ed.

passed this examination. If the Sanitary Institute's examinations are to command the respect of men engaged in the building trade, a few leading builders and plumbers will have to be included on the Board of Examiners.

Another examination of a much higher standard should be established for those inspectors who had gained practical knowledge, and who had passed the lower grade examination. A sound knowledge of building construction should be demanded from all candidates. C. S. I.

HOUSE DRAINS.

SIR,—In the locality in which I reside there is a street having about fifteen houses on each side. A short time ago I received instructions from the owner of one of these houses (near the low end of the street) to make some slight alterations to the water-closet and sink; this alteration was for convenience, nothing else. During the progress of the work, the Borough Engineer came on the job, and gave instructions to the effect that I must place an intercepting-trap in the drain. This drain runs along and close to the back of the houses (not in the street), taking the sewage from all the houses on this side. This trap would, of course, cut us off from the main sewer and two or three houses below us; but there are about a dozen houses higher up that would come into the same trap. I also understand that each person on this side who does anything to his drains will have to fix an intercepting-trap also, so that in course of time the present straight line of drain will become one continuous run of intercepting-traps.

These traps (the engineer informs me) are to be made of four easy bends (in this case 9 in.), having a junction at one end to connect a pipe leading to the ground surface, so as to allow a rod to be pushed down and through the trap should it become stopped. All this, he says, we are compelled to do. I also understand that he speaks of disconnecting chambers as cesspools.

Will you, Sir, or some one qualified, kindly give an opinion upon the foregoing, and oblige not only others, but

X. Y.

* * If our correspondent's description of the facts is correct, the injunction of the Borough Engineer is preposterous. If each house is, by the letter of the law, to have an intercepting-trap, it should be between the house and the common drain. If there is no room for that, and if the common drain has a good fall, the intercepting-trap should be between the lowest houses and the sewer, and will do there all the good that it can do. Of course, the position is a bad one to begin with, as the common drain in such a case is practically a short length of sewer; but how any one could suppose it was to be improved by zig-zagging the whole length of the drain into a series of traps, which would be the result if the proposed system were completely carried out, it is difficult to understand.—Ed.

THE EXPLOSION OF RANGE BOILERS.

SIR,—Your leading article on this subject in last week's *Builder* is without a shade of doubt correct in every particular, and, so far as the more eminent of the profession are concerned (I mean the chief architects), the advice will be ample and sufficient. But, although you do not waste the pages of the *Builder* in trying to educate the very builder or his architect, I am sure you will not object, in the interests of humanity, to my naming a fifth cause of danger which is seldom seen to exist in other than this class of building,—viz., the expansion or air-pipe is taken up outside and exposed above the roof. The folly of this arrangement is so apparent that it may be only necessary to call attention to the fact to prevent its being repeated. R. CRANE.

* * We should think the cases of the expansion-pipe being taken up outside the house for its whole length were very rare. Projecting a short length of it above the roof when the rest is inside the house might lead to stoppage, and the pipe should be where it can be seen; but in this climate the danger from this cause can hardly be so great as our correspondent seems to suggest; and in other respects it is the most convenient way of disposing of it. Still, the point is worth drawing attention to.—Ed.

ST. PANCRAS MUNICIPAL BUILDINGS.

SIR,—Like many others of your readers, I have in response to the advertisement in your journal written for and obtained the particulars of the competition for the proposed St. Pancras Municipal Buildings.

In these we are told that "The Vestry would be advised in the selection of the premiated designs by an independent professional assessor."

So far, so good; but if the Vestry of St. Pancras really desire that "competent and experienced architects" should submit designs for their new buildings, it is imperative, in view of the experience gained by the profession as to the ways of London Vestries in previous instances, that the Vestry of

St. Pancras should state their intention of adopting the advice of their assessor, and, further, of employing as their architect the author of the first premiated design—provided, of course, that he can show to the satisfaction of the assessor that he is "competent and experienced."

Otherwise, there can be no doubt that every self-respecting, "competent, and experienced" architect will be, like myself,

A NON-COMPETITOR.

Our correspondent's estimate of the chances of fair play in a Vestry-ordained competition is, we fear, only too near the mark. As a general rule we have declined to adopt the position that committees should pledge themselves to act on the recommendation of the assessor; but where London Vestries are concerned we believe this is the only condition under which any architect who values his time and his self-respect would think it wise to compete.—Ed.

ORIENTATION OF CHURCHES.

Sir,—May I ask whether any ancient rule for orientation is ever followed in modern church building?

The question is suggested by the plan of Truro Cathedral, which you have just published, showing the old south aisle of the parish church of St. Mary incorporated with the cathedral.

It seems clear that the rule of the Perpendicular masons on this subject,—unless, indeed, their own work was influenced by the lines of a still older erection,—has regulated this nineteenth-century plan, so far as orientation is concerned, for the axis of the aisle of the church is parallel with that of the cathedral.

It would at all events be interesting to know, if the bearing of these axes is not due east, how many degrees it is to the north or south of that point.

J. HOUGHTON SPENCER.
Taunton, November 7.

BONE AS A BUILDING MATERIAL.

Sir,—I can give another instance of the use of bone for constructional purpose. In the stone pith of the chancel stalls of St. Mary's, Sandwich, small bones were used as cramps. My note of this was made in August, 1881, when the construction was bare, and the cramps visible.

During the flourishing days of the whale fishery, the jawbones of the whale were often used as gate-posts. At Brighouse, West Riding of Yorkshire,

there is a residence called "Bone-gate House," a reminiscence of the usage. S. J. NICHOLL.

Sir.—In addition to the instances of bones used as a building material quoted by Mr. Blashill in your issue of November 5 (p. 366), I give the following:—

Last year, when pulling down an old house here, the builder came across an old well under the floors. This well, which was about 3 ft. in diameter, was stoned by means of ox-horns, disposed round in such a way that they crossed and overlapped, thus forming a sort of bond. The horns were of an unusually large size, and of that form which may be seen on the heads of Highland cattle; and as they were very dry and brittle, they seemed to have been in their position for some centuries. The whole lot, excepting three I managed to secure, were taken to the manure works; there were about three cart-loads of them. W. G. WATKINS.
Lincoln, November 9.

The Student's Column.

CONCRETE.—XXI.

STRENGTH OF CONCRETE BEAMS.

WE have in previous articles given the strengths of limes, cements, and mortars, and from these the transverse strength of concrete has often been calculated, but these data are at the best unsatisfactory. Even transverse tests of mortars are not to be relied on. They are like the results obtained by Tredgold and other early experimenters on the transverse strength of small pieces of wood; the strength of beams, calculated from the results thus obtained, was always placed too high. In order to obtain an approximate estimate of the proper strength of concrete beams, we must deduce our constants from the breaking weights of similar beams. The following table gives a few results of that kind, together with the constants or co-efficients of rupture, deduced from the same according to the formula,— $W = \frac{2}{3} C \frac{BD^2}{L}$, which, being transposed, gives $C = \frac{3WL}{2BD^2}$:-

The first thing which strikes us on a perusal of the subjoined table is the great difference in the strength of the various beams. If, however, we make due allowance for the different proportions of cement and aggregate in the several concretes, and for the difference in their age at the time of testing, we find that the variation in strength is really not excessive, although doubtless sufficient to cause any calculations based on some of the highest of the constants to be viewed with a certain amount of suspicion. The dissimilarity of the results is also due in part to the fact that the experiments were carried out at different times, by different persons, with different cements and aggregates. The table will, however, prove useful, although it is not as valuable as we should have liked it to be. It is indeed, impossible from existing data to calculate with accuracy the value of C for variously-proportioned concretes; a long series of experiments would be required before this could be done. It may be suggested that the Royal Institute of British Architects should carry out such experiments, which would find its Science Standing Committee some work to do, and would benefit the whole profession. Until such experiments have been made, architects must perforce proceed more or less empirically in the construction of concrete foundations, floors, roofs, &c. The transverse strengths of neat cement and of different mortars were given in Table XIV, page 192, ante. Let us turn now to the strength of beams in general.

To find the strength of rectangular beams supported at the ends and loaded at the centre we have the formula

$$W = \frac{2}{3} C \frac{BD^2}{L} \dots \dots (I).$$

For beams supported at the ends and uniformly loaded we have

$$W = \frac{4}{3} C \frac{BD^2}{L} \dots \dots (II).$$

For beams fixed at the ends and loaded at the centre we have

$$W = \frac{4}{3} C \frac{BD^2}{L} \dots \dots (III).$$

TABLE XXIII.

Transverse Strength of Concrete and other Beams, supported at ends.

No.	Composition.			Age in Days.	Brdth. In.	Depth. In.	Clear Span. In.	No. of Tests.	Loaded at	Average Breaking Weight. Cwt.	Reduced to Breaking W. at Centre. Cwt.	One-half* Weight of Beam between supports. Cwt.	Total Central Load. Cwt.	Constant.	Average Constant	Authority.
	Portland Cement.	Sand.	Aggregate.													
1	1	—	1 coke breeze	7	3	5	72	1	centre	3.85	3.85	0.31	4.16	5.99	—	A
2	1	—	2 crushed brick	5	12	8	60	1	"	13.23	13.23	1.67	14.9	1.74	—	A
3	1	2 c	"	90	"	12	36	2	central 6"	155	142.06	1.55	143.61	4.48	3.88	B
4	1	2 c	"	"	"	"	"	3	"	113.33	103.88	1.55	105.43	3.29	—	B
5	1	—	4 clean breeze	43	30	6 1/2	59	1	central 16"	66.32	57.32	2.12	59.44	4.15	3.63	C
6	1	—	4 broken brick	"	"	6	59.5	1	"	49.52	35.07	2.53	37.6	3.11	—	D
7	1	0	5 shingle	139	12	12	36	1	centre	85.82	83.62	1.77	87.39	2.73	—	D
8	1	2	5 "	"	"	"	"	1	"	68.74	68.74	1.91	70.65	2.21	—	D
9	1	3	5 "	"	"	"	"	1	"	43.61	43.61	1.84	45.45	1.42	—	D
10	1	2	6 gravel	60	12	12	36	3	central 6"	27	27	1.76	28.76	0.89	—	D
11	1	2	2 broken stone, 1 1/2 in.	"	"	"	"	3	"	46.67	42.78	"	44.54	1.39	—	D
12	1	2	4 " " 3 1/2 in.	"	"	"	"	3	"	52.5	48.12	"	49.88	1.56	1.39	B
13	1	2	6 " " 1 1/2 in.	"	"	"	"	3	"	40.83	37.43	"	39.19	1.22	—	D
14	1	0	9 shingle	95	12	12	36	1	centre	83.06	83.06	.77	83.83	2.31	—	D
15	1	1	8 "	"	"	"	"	1	"	39.33	33.33	1.53	39.85	1.24	1.27	D
16	1	2	7 "	"	"	"	"	1	"	71.18	71.18	0.92	72.10	1.12	1.18	D
17	1	3	6 "	"	"	"	"	1	"	38.33	38.33	1.81	40.17	1.25	—	D
18	1	3	6 " screened	28	21	9	45	1	central 6"	18	18	1	18	1	—	D
19	1	4	5 "	95	12	12	36	1	centre	30.28	30.28	0.93	31.21	0.94	0.94	D
20	1	4	5 "	139	"	"	36	1	centre	20.04	20.04	1.86	21.90	0.63	—	D
21	1 1/2	1	3 gravel (3 in. to 4 in.)	182	6	12	36	1	central 12"	18	18	0.57	18.35	0.55	0.92	E
22	1 1/2	1	3 broken stone (1 in. to 4 in.)	100	2	2	4	2	centre	20.88	18.35	3.08	21.43	0.85	—	D
										13.6c	11.92	"	15	0.54e	—	F
										24.91	24.91	.84	25.75	0.40	—	F
										23.71	23.71	1.69	25.4	0.79	—	G
										5.22	5.22	a	5.22	3.91	—	G

Notes to Table XXIII.

* The weight of the beam itself is part of the load, and must, therefore, be considered in the calculations, otherwise grossly inaccurate results would sometimes be obtained; e.g., the weight of the first beam of the three numbered 18 is nearly three times as much as the load put upon the beam. The weight of the beam must really be considered as a distributed load, and as the stress of a distributed load is only one-half that of a central load, one-half the weight of the beam is given in the column.

† Slag cement. ‡ Roman cement.

a. Weight too small to be considered. b. Presumably seven days; the various ages of the beams should be carefully noted.

c. Coarse sand. d. Fine sand. e. Part of a larger beam which fell before it had properly set, and was, therefore, probably strained.

Authorities.—A, David Kirkaldy; B, John Kyle; C, Col. Crozier; D, Darton Hutton; E, C. Colson; F, Wm. Kidd; G, Q. A. Gillmore.

or beams fixed at the ends and uniformly loaded we have

$$W = 2C \frac{BD^2}{L} \dots \dots (IV).$$

or beams fixed at one end, supported at the other, and loaded at the centre we have

$$W = \frac{8}{9} C \frac{BD^2}{L} \dots \dots (V).$$

for similar beams uniformly loaded we

$$W = \frac{4}{9} C \frac{BD^2}{L} \dots \dots (VI).$$

or beams fixed at one end only, and free at the other, and uniformly loaded, we have

$$W = \frac{1}{3} C \frac{BD^2}{L} \dots \dots (VII).$$

These are the formulae given by Professor Whipple, although somewhat differently expressed. It will be noticed that formulas II., III., and VI. are the same, and that the strength centrally-loaded beams with fixed ends is 50 per cent. more than when the ends are supported, while that of uniformly-loaded beams with fixed ends is only 50 per cent. more than with the ends supported. In the former ratio is as 100 is to 50, in the latter as 100 to 66.6.

Prof. Anderson, in his "Strength of Metals," says:—"The increase of strength, due to the fixing of the ends, has been variously estimated [from once-and-a-half to twice the strength when supported]; . . . but it is enough that the value will depend upon so many conditions that it is impossible to say precisely what it is hereofore; it must, therefore, be considered as doubtful, unless all the conditions are known definitely; at the same time, the importance of secure fixing, wherever it can be employed, should be noted."

In the case of concrete floors, laid over the walls when these have reached the proper height, and subsequently built upon, we have a free of fifty far in excess of that attained when the concrete is simply let into chases in the walls, or supported on corbelled-consoles projecting therefrom. In the former case we may use our calculations on the fact that the ends, edges, of the floor are fixed, providing, of course, that the weight of wall above the floor is rigid; but in the latter case we can only assume that the ends are to some unknown extent held in addition to being supported. It may be thought that floors resting on corbelled-consoles are supported, and nothing more, but this is not the case, for the concrete shuts against the walls, and is prevented by them from spreading; in this way, the floor becomes really a flat arch or (contradiction in terms) a dome, and may carry as much as if the ends were fixed by being built into the wall. This, at least, has been shown by experiment to be the case with concrete beams tested by Mr. Colson, and described by him in the "Proc. Inst. C.E.," vol. II. (1877-8), part iv. Two concrete beams were formed, 9 ft. long, 21 in. wide, and 9 in. deep, supported 4 in. at each end, the concrete being composed of 1 part Portland cement, 3 parts sand, and 6 parts crushed barrow shingle. The ends of one of the beams (No. 1) were prevented from spreading

possibility of lateral movement, in the slightest degree, in the supporting girders of a floor; in this case by so doing the supporting power of the beam was materially increased. It also shows that the mass within the dotted line *a b c* (fig. 3) adds nothing to the strength of the beam when confined at the ends, as proved by the crack appearing so soon after the commencement of the loading." Three other concrete beams, of exactly similar composition to the two just mentioned, had previously been made and tested by Mr. Colson; the results of these tests are given in Table XXIII., No. 18. The average value of *C* for two of these beams is 1/2, the ends being simply supported, while the value of *C* for the beam confined at the ends, if we use the formula for a supported beam, is no less than 2/3, or nearly three times as much. According to the usually accepted formulae for the strength of beams, fixing the ends, at the most, only doubles the strength (see formulas I. and III.), but in this case merely confining the ends effected a somewhat greater increase.

If we may judge from Mr. Colson's experiment, the great compressive strength of the material enables a flat concrete beam, when the ends are simply confined, to become to all intents and purposes an arch capable of carrying as great a load as if the ends were securely fixed. This, however, needs further proof, and, until this is forthcoming, care should be taken that all concrete floors, &c., subject to transverse stresses, should have the edges as securely fixed as possible, in order that full advantage may be taken of the increase of strength which such fixing is known to insure.

GENERAL BUILDING NEWS.

NEW BANK PREMISES, CORNHILL.—The new banking-house of Messrs. Prescott, Dimsdale, Tugwell, Cave, & Co. (Limited), at 50, Cornhill, was opened for business on Monday last. It is numbered 50, Cornhill, but it has been erected not only on the site of Dimsdale, Fowler, & Co.'s old bank at No. 50, Cornhill,—a modern building erected in 1859, Mr. Angell being the architect,—but the site of No. 49 as well, which was occupied by Messrs. Barrard & Lund, the chronometer makers. The lower portion of the facade consists of a bold Aberdeen grey granite arcade, the upper part being of red brick with Portland stone dressings. Practically the whole of the ground floor is taken up by the banking-hall, or telling-room, a very fine apartment, which is lighted by the great windows on Cornhill, and by a large glass dome at the rear. The walls are faced with English alabaster, with Spanish mahogany dado and cornice. The counters and desks are also of Spanish mahogany, and constitute some of the best work we have ever seen in the way of office-fittings, both as to material and workmanship. At the back of this hall is a staircase leading to the upper and lower floors, with two rooms for the directors' use. The large room is intended for the directors' duty, and commands a view of the whole of the counting-house, while the other room is of a more private character. Interesting records of the several amalgamations of the present banking firm are to be found let into the white marble mosaic floor of the great hall near the entrance. These are in the shape of the "signs" of the four different banks which have united: Cornhill, 1762; Threadneedle-street, 1763; High-street, Bath, 1770; and Corn street, Bristol, 1760. Between the ground and first floors is a gallery extending down one side of the banking-hall, fitted with clerks' desks, and two or three private rooms. On the first floor are the board-rooms, the secretary's offices, luncheon and waiting rooms. The upper floors will be in the occupation of the residential staff. Below the ground are two basement floors, and it is here that the strong-rooms, nine in number, are built. In the sub-basement, portions of the ancient Roman wall discovered while the excavating operations were in progress, have been preserved. The alabaster work and the marble mosaic work has been executed by Messrs. Burke & Co.; the lifts are by Waygood & Co., the sanitary and electric fittings by Hayward Tyler, & Co.; the strong-room doors and safes by Messrs. Chubb & Sonland's warm-air ventilating stoves are used in the telling-room; and Claridge's asphalt is used for roofing flat. The architect is Mr. Henry Cowell Boyes, F.R.I.B.A., the clerk of works being Mr. William Payne. The general contractors were Messrs. Cubitt & Co. The total cost has been upwards of 25,000*l*.

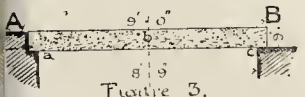
NEW CHURCH, GURNARD, ISLE OF WIGHT.—The corner-stone of a church which is being erected at Gurnard, Isle of Wight, was recently laid. The site of the new building is on the main-road leading from Cowes to Gurnard. The church is to be a building of brick, in the style of the thirteenth century, the walls being relieved internally and externally by bands and patterns of coloured brick.

The roofs will be tiled. The plan consists of a wide nave, arranged so that all the worshippers may have an uninterrupted view of the chancel. The latter is to open into the nave by a broad arch. On the south side will be a vestry, and on the north an organ-chamber, both opening into the church. The seats are to be open benches, and the accommodation is to be, in the nave alone, for a congregation of over 250. Provision will be made for the extension of the building at some future period. The windows will be made to harmonise with the style of the church, in brickwork of patterns, but the east window is to be of decorative tracery of stonework. A spire of timber covered with tiles will be placed over the chancel arch, and will, with its cross, rise to a height of about 62 ft. The church will be 87 ft. from east to west, by a breadth in the nave of 28 ft. The passages will be paved with black and red tiles laid diagonally. The roof will be of open timber work. The windows are to be filled in with cathedral glass of various tints of colour. The church has been designed and the works are being superintended by Mr. E. P. Loftus Brock, F.S.A., architect, of London. The builders are Messrs. Ball & Son, of West Cowes.

EQUITABLE ASSURANCE OFFICES, MANCHESTER.—We learn that an important and costly granite contract is now on the point of completion by Messrs. James Wright & Sons, Royal Granite Works, Aberdeen, consisting of a main doorway and piers for the new premises of the Equitable Assurance Company, Manchester. The doorway is of elaborate design. Constructed of grey Rubialaw granite, it rises to a height of 15 ft. from the level of the ground. The two jambs are fully 8 ft. high, and, particularly on the front, are finished with sweeping lines of deeply-graven mouldings. On the impost or lintel, the main surface is formed by mouldings into an oblong panel, and the smaller impost is surmounted at each end by an intricately designed pilaster, fully 3 ft. 6 in. high, consisting of a base, shaft, cornice, and a ball finial. Each of these parts is marked by deep, sharply-cut mouldings. In the centre of the space between the pilasters is a circular panel, sunk about 6 in., and surrounded by mouldings of the most intricate character. The whole is surmounted by a cornice of rich design. The whole of the work, mouldings included, is polished. The doorway is flanked on both sides by a pier of red Peterhead granite, also 15 ft. high. Each pier consists of a bottom-pilaster, a shaft—with centre band,—and a massive ball corbel, surmounted by a moulded cornice,—the continuation of the cornice over the doorway. There are nineteen of these piers, and there are about 2,600 cubic feet of granite in the job. The piers, like the stones of the doorway, are polished on all the exposed surfaces. The architects are Messrs. W. Waddington & Sons, of Burnley.

MELLISSON'S SKATING-RINK, BRIGHTON.—Those who remember the palmy days of roller skating in Brighton will recollect that "Mellison's" at the large Concert-hall in West-street, was one of the most favoured resorts. It has now returned to its former use. According to a Brighton paper, the great hall has been entirely reconstructed. It is 162 ft. long, 46 ft. wide, and 40 ft. high to the ceiling. A room opens out of the hall, and in front of this is a restaurant, the special feature being the lowering of the floor at the entrances to the street level. The ball room restaurant approached from West-street, on the pavement level, by two entrances, enclosed by screens and swing doors (through which the restaurant is entered), and there is also an entrance doorway in Middle-street, which will be available as a means of exit. On the first-floor level a balcony extends round three sides of the hall, reached from the hall floor level by means of three flights of stone steps, one at each entrance, and from landings on these staircases are reached the ladies' and gentlemen's lavatories. Above the restaurant and tea-room are a saloon and the kitchen, &c., communicating with the restaurant by means of lifts. Ample accommodation is provided for skate-rooms, cloak-rooms, stores, &c. The walls are built with piers, with enriched cornice and frieze, formed into bays, and the ceiling is coved and panelled in plaster, with a centre horizontal light of embossed glass running from end to end. The balcony is carried on iron cantilevers, encased in moulded plaster-work. The floor of the hall is formed of iron joists and concrete (supported by iron columns), covered with American maple in narrow widths, laid with the greatest possible care so as to ensure a perfectly even and level surface, the boards being laid diagonally at each end of the hall so as to avoid friction. The lighting is by electric light by means of fourteen seven-light electrolights and eighty pendant lights under the balcony. The architect of the work was Mr. Alfred Carlton, of Brighton. The contract was carried out by Mr. W. Taylor, of York-place. The electric light installation was provided by Messrs. Crogson & Co., Upper Thames-street. The balcony fence and open ironwork are by Messrs. Reed & Son.

GOLF CLUB-HOUSE, EPSOM.—This building has just been completed. It is situated close to Epsom Downs Station, and overlooks the links. It is of red brick, the upper portion being covered with red tiles. The entrance is from the verandah, which opens into an entrance-hall, 20 ft. high, surrounded by a gallery and having a timbered roof. The dining-room is on the left of the hall; it is 30 ft



by counterforts as at A, fig. 3; while those of the other beam (No. 2) were simply supported at B. At the end of fourteen days the moulding under the concrete was very carefully removed, when beam No. 2 at once broke by its own weight, while beam No. 1 exhibited no sign whatever of weakness. "After remaining unsupported for a further period of six days, the beam (No. 1) was tested by placing lights on the centre. Under 0.25 ton a faint crack was observed at the centre through the sole width of the beam; with 0.635 ton it increased as nearly as could be determined half the depth, viz., 4 1/2 in., and opened to 1 1/2 in. at the lower surface. The full extent of the fracture probably exceeded this, though not apparent on the surface. No perceptible upward extension of the fracture took place, however, he detected after the imposition the weight last referred to. The load at the centre was ultimately increased to 1.292 ton, when the beam broke. This experiment shows the necessity of guarding against the

long and 20 ft. wide, with a large bay-window at one side. The room is heated by two fireplaces with carved oak mantelpieces. A service passage communicates with the kitchen. The dressing-room is on the opposite side of the hall, and is fitted with lockers. There is a large lavatory, with a range of lavatory basins supplied with hot and cold water, and with two water-closets adjoining. The smoking-room is placed on the first floor, immediately over the dining-room. It is approached by an oak staircase having the club grass carved on the newel-post. The room is 30 ft. long, with a large bay window on one side and an oriel window at one end. Two French casements give access to a balcony from which a view of the play can be obtained. The room has an open-timbered roof. There are four bedrooms, which are entered from the gallery, with bath-room and water-closet adjoining. The kitchen, scullery, and servants' bedrooms are at the back of the premises. The professional's workshop and saddler's room are under the dressing room and lavatories, and are approached by an external staircase. Wine and beer cellars are provided in the basement. The building has been designed by J. Hatched Smith, F.R.I.B.A., London. The work has been carried out by Mr. H. Adams, builder, Sutton. The building cost about 3,000.

NEW "PALACE OF VARIETIES" FOR BRISTOL.—We are informed that the designs prepared for the new Bristol Empire Palace of Varieties by Messrs. Wilson & Long, London, have been passed by the local authorities, and that a contract for the erection of the building has been arranged with Mr. Frank Kirk. The new theatre is intended to be opened next Whitsuntide. The building will be situated in the busiest portion of the city, and has been designed to be used not only as a theatre, but by a simple mechanical arrangement the stage can be removed to give place to a circus-ring.

ALTERATIONS AT SANDRINGHAM HOUSE.—The alterations at Sandringham House, rendered necessary by the fire which occurred a year ago, are, says the *Daily News*, now practically completed. That portion of Sandringham House that was destroyed by fire has been rebuilt in fireproof construction with iron and concrete floors and roofs. Various additional rooms have been added, and care has been taken to provide against further damage by fire. The rooms which were damaged have all been re-decorated. On examination it was found that considerable damage had been done by water, especially in the Princess of Wales's boudoir and the bed-rooms on the first floor, and the plastering had to be all stripped from several of them to enable them to become thoroughly dry. With the exception of the Princess's boudoir, all this work is completed, and the rooms are now occupied. The local tradesman having expressed a desire to subscribe to some memorial of the late Duke of Clarence and Avondale, this has taken the form of a clock, which is to be placed over the ball-room entrance, and the turret has been raised to provide for this. A considerable addition has been made on the south side of the house by the erection of two additional stories over the bowling alley and billiard room, to be called "The Bachelors' Wing." The upper story consists of servants' rooms. Separate staircases have been made to this wing, which is all of fireproof construction. The elevation of this new portion, which faces the terrace and the pleasure gardens, is faced with Carr stone, with brick and stone dressings. About eighteen new rooms have been added in all, with bath-rooms, &c. The internal woodwork is all in pitch-pine, and the whole work, as well as the furniture for the new rooms, has been designed by Mr. Robert W. Edis, architect, London. Various additions have been made to other portions of the house, in the housekeeper's and servants' departments. The general works have all been carried out by local tradesmen. Mr. Brown, builder, of King's Lynn, has done the bulk of the work, whilst Messrs. Chivers & Ritchie, of Snettisham, have done other portions. Messrs. Homan & Rodgers, of London, have provided the fireproof flooring, new wing, Messrs. Holland & Sons, of London, the decoration, and Messrs. Maple & Co. the furniture for the new wing. Extensive alterations and enlargements have been made to what has hitherto been known as the Bachelor's Cottage, which is situated a short distance private residence for his Royal Highness the Duke of York. A new dining-room and several bed-rooms and offices have been added, the whole work having been carried out by local tradesmen from plans prepared by Mr. Beck, of Norwich, Colonel Edis acting as consulting architect. From the Duke of York's Cottage a new road has been constructed towards West Newton, and at its entrance a thickened ledge has been erected and large gates are being provided. A new lake, or duck-pond, of considerable area, has been excavated in the middle of the park. This has been excavated by a stream running through the park from the old lake opposite the Duke of York's Cottage, which lake has been much enlarged. Mr. E. C. Shearman has acted as clerk of the works.

SCHOOL BUILDINGS, FALMOUTH.—A new High School has just been erected at Falmouth, at the

corner of Wood-lane. The school is built with Bridgewater red brick, the style being "Queen Anne." The panels for the front bay window and porch are terra-cotta, the cornices, caps, and coping being Bath stone. The walls are built hollow, and the roof is close-boarded and slated. A corridor runs from the main entrance to the end of the building. On the right, on the ground floor, is an assembly-room, 35 ft. by 20 ft. This room is at present used as the gymnasium. The kindergarten-room measures 20 ft. by 16 ft. Opposite to this is a corridor is a large cloak-room. The upper rooms are five class-rooms, as well as a sitting-room for the assistant-mistress. Each room has a dado of varnished red pine, and is ventilated by means of Tohin's tubes and ventilators near the ceiling. The contractor for the building was Mr. J. S. Kelway. The architect was Mr. T. Wonnacott, of Falmouth.

ADDITIONS TO THE QUEEN'S HOTEL, CARDIFF.—On the 3rd inst. one section of the extensions made to the Queen's Hotel, Cardiff, was opened to the public. The portion opened consists of the main hall and bar. The latter occupies a central position in the hotel buildings, the entrance approach being a series of continuous lobbies opening into a hall. The upper portions of the hall and lobbies are in teak wood, in Lincolns-Walton decoration, and the floors are in mosaic. The bar is 33 ft. 6 in. long and 23 ft. wide, the height being 15 ft. The decorations are mainly in cream and gold, these having been done by Mr. Jas. Rosser, under the superintendence of Mr. Allan, the contractor. Around the bar stained glass has been used, this having been supplied by Mr. Samuel Evans, of Birmingham. The floor is of stained glass of floral pattern. The ceiling is of joint architects to the Queen's Hotel Company are Mr. J. P. Jones and Mr. C. E. Waring, the contractor being Mr. James Allan. Mr. John Evans was the foreman, and Mr. T. Alexander the clerk of the works.

SANITARY AND ENGINEERING NEWS.

SANITARY BUILDING REGULATIONS AT WEST HARTLEPOOL.—We are glad to learn that in this rapidly-increasing seaport town the Sanitary Authority is actively engaged in many schemes for the further improvement of the district, including sewerage works, street works, new abattoirs, &c. One of the most beneficial amendments, however, so far as the public health is concerned, consists in the new regulations in connexion with the erection of new buildings, which requires that each new dwelling-house erected after the present date shall have a water-closet, together with a domestic refuse. Up to the year 1854 the old open privy flourished in all its ugliness, and so sewer pipes might be made the more foul, such sewer was required to cause a drain to be laid from such open ashpit to the public sewer. In 1854 a regulation was made requiring the ashpits to be covered; the bottom of the ashpit was not to be lower than the level of the adjoining street, and the drainage into the public sewer was prohibited. In 1856 a somewhat modified privy was permitted, taking up less yard space and, therefore, restricting the amount of space for the disposal of filth. This privy comprised a movable galvanised pan, which was made the receptacle of all excrementitious matter, as well as the dry domestic refuse, and was emptied weekly. Mr. J. W. Brown, A.M.Inst.C.E., the Borough Engineer, under whose advice the new regulations have been made, has been a strong advocate for the water carriage system for many years, and he has now succeeded in inducing his Council to abolish from the district one of the most objectionable forms of storage and removal of filth.

PIER PAVILION, CLACTON-ON-SEA.—The tender of Messrs. Reed, Bight, & Co., contractors, Westminster, has been accepted by the directors of the Clacton-on-Sea Pier and Pavilion Co., for the erection of the new pavilion and sundry other works at their pier. The engineers are Messrs. Kinnip & Jeffrey, of London.

SEWAGE PRECIPITATION WORKS AT WOODVILLE.—For a long time past a stream flowing through Lord Carnarvon's property near Burton-on-Trent charged from the various factories by crude sewage discharges. A few months ago the directors of Messrs. Brunt, Bucknall, & Co.'s brewery, which produces a large volume of sewage and waste liquor, determined to set an example to their neighbours by erecting works for chemically treating the sewage. The works have been designed by Mr. Albert Wolheim, during the entire day of accumulation in a syphon tank and treated only during the several discharges of the latter, and an electrical alarm will be connected with the office to give timely warning of such discharge. A night storage tank has also been provided. The precipitation tanks are in duplicate, and can be worked either on the continuous or separate systems. The treatment will be by the "Amines" process.

FOREIGN AND COLONIAL.

FRANCE.—Now that the Bill has actually been submitted to Parliament, the reconstruction of Opéra Comique is to be entrusted to a large contractor, on condition that the State shall guarantee a certain subscription for a specified time. No Société Générale des Architectes has not passed in this arrangement, the adoption of which will be the architect under the orders of a special builder, and M. Daumet has been commissioned to address a petition to the Minister of Public Instruction and Fine Arts, to protest against the proposed proceeding. On the other hand, the Association des Architectes, who have received diplomas from the Government, have asked the Senate to decide the matter in competition. —The Municipal Council of Paris has just taken into consideration a proposition made by M. Létoury, architect, for the completion of the Boulevard Haussmann. The question will shortly be decided. —Impressionists and Symbolist Painters open their third exhibition on the 15th inst., at No. 15, Rue le Peletier. —The Luxembourg Museum has just been enriched by a fine bust in gold and entitled "Gallia"; it is the work of M. Mor Vanthier. —There is an interesting collection of pastels and water-colour drawings by M. Degas on view at the Galerie Durand Ruel. —The Director of the Carnavalet Museum has lately acquired a "Épique de la Géographie d'Europe," printed in 1553 at Lyons, and which contains the oldest plan engraving of the plan of Paris. —M. Roussier, Architect of the Minister of Posts and Telegraphs has just given up to the Administration the Hôtel des Téléphones, in the Rue Gutenberg. —Up to the present time, no discoveries of interest have been made in the ruins of the Palace of Saint-Germain, the Palace of the Clémence, now been acquired by the Princesses of Bulgaria, and has been taken over by the Minister of Posts and Telegraphs. —M. Harpinet, architect, St. Cloud, just sent in a notice to the Municipality of that town, that the church clock threatens to fall, and will injure several neighbouring houses if it does. The church itself is built on beds of loam.

work of strengthening will be begun immediately to avert a catastrophe. —The jury for the competition of painters, initiated by the Département de la Seine for the decoration of the marriage hall of the Mairie at Montreuil-sous-Bois, has just given its judgment. The commission for executing, amounting to 21,000 francs, has been awarded to M. Bourgonnier; the second prize has been given to M. Henri Martin, and the third to MM. Gorg and Courtois. —There is a question of giving the town of Valence (Drôme) which is his country the status of the post Emile Augier, instead of erecting it in Paris. It is to be paid for by public subscription. —The Lyons Society of Fine Arts will open its sixth annual exhibition on February 24 next, in the Pavillon of Fine Arts in the Place Bellecour. The exhibition is open to foreign artists as well as to French. —The Exhibition of Fine Arts of Monaco will be open from December 1 to April next, that at Nantes from February 1 to 23. —A narrow-gauge railway will shortly be made in Haute Marne, between Fayl-Billot and the station of Charmoy. —The restoration of the old church of Souillac will shortly be undertaken. It is a "historic monument" of much interest. —M. Capitaine Place has just submitted to the examination of the Academy of Sciences an apparatus which is to discover flaws in the interior of blocks of beams of iron or other metal employed in construction, and which might be the cause of sudden failures. He calls his apparatus the "Schiesophone." —The inundations in the South of France have caused the ruin of thirty-nine houses in Pezignan, and carried away several bridges.

BERLIN.—There has been a serious disruption of the Berlin Exhibition, which is the cause of the "Verein Berliner Künstler," of which Anton Werner is President, caused by a controversy on the merit of some Swedish paintings which have been exhibited under the auspices of the society. The incident is much regretted, as the society was very popular as the promoter of the Berlin International Art Exhibitions, and other successful enterprises. Another of the series of new churches has been opened with much ceremony. This one is situated in the poorest district of Berlin. Half the cost of its erection was defrayed by the Royal family. —Berlin is to have a new Municipal Hospital, with 800 beds. This will be the fourth modern structure of the kind in the Prussian capital. It will be situated to the north of the city. The "Urban" Hospital, which was completed last year in a southern suburb, was completely expressed by our German contemporaries that the Malmö Harbour Competition has resulted in Herr Kummer, of Dantzig, obtaining the first premium, and a Brunswick firm of civil engineers obtaining the second. The third premium went to Sweden. The proposed harbour works are very extensive.

DRYMARK.—There appears now some probability of the new Drymark works, for the commencement of the rebuilding of the Christiania Palace, which was burned down in October, 1834. Meanwhile, two committees have been set up for collecting national contributions towards the undertaking, and a sum of 60,000, has been collected for

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary.

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., & viii. Public Appointments, p. xxi.

the instrument may be made sensitive to very low velocities without impairing its ability to resist the most severe gales. In the present paper the author describes an arrangement of this form of anemometer which he has devised for indicating very light winds, as well as recording the maximum wind pressure.

SOCIETY OF ARTS.—The inaugural address of the 133rd session of this Society was delivered on Wednesday evening last by the Chairman of the Council, Sir Richard Webster, Q.C., M.P. Previous to Christmas there will be four other meetings. Mr. Seymour Haden, F.R.C.S., will read a paper on "The Disposal of the Dead," on November 23; Mr. James Douglas, one on "The Copper Resources of the United States, on November 30; and Mr. James Dregho, one on the "Chicago Exhibition of 1893," on December 7. At subsequent meetings, the dates of which are not yet published, papers will be read by Prof. George Forbes, F.R.S., on "The Utilisation of Niagara," Mr. Bennett H. Brough, "The Mining Industries of South Africa;" Prof. Francis Elgar, LL.D., "Transatlantic Steamships;" Prof. Frank Clowes, D.Sc., "The Detection and Estimation of small proportions of Inflammable Gas or Vapour in the Air;" Mr. William Key, "The Purification of the Air Supply to Public Buildings and Dwellings;" Mr. Wilton P. Rix, "Pottery Glazes, their Classification and Decorative Value in Ceramic Designs;" Prof. W. Noel Hardley, F.R.S., "The Chemical Technology of Oil-holding, with a description of a New Process for the Preparation of Drving Oils, and an Oil Varnish;" Sir William Wilson Hunter, K.C.S.I., C.I.E., LL.D., "Ten Years of Progress in India;" Sir Edward N. C. Braddon, K.C.M.G., Agent-General for Tasmania, "Australia as a Field for Anglo-India Colonisation;" Sir Juland Danvers, K.C.S.I., late Public Works Secretary, India Office, "Indian Manufactures;" Mr. Jervoise Atelstean Baines, I.C.S., Imperial Census Commissioner for India, "Caste and Occupation at the last Census of India;" Mr. Edward J. Howell, "Mexico, Past and Present;" Mr. Cecil Fane, "Newfoundland;" Mr. W. B. Percival, Agent-General for New Zealand, "New Zealand."

LEGAL.

CASE UNDER THE METROPOLITAN BUILDING ACT.

At the South-Western Police-court, on the 11th inst., Messrs. Strudwick & Co., builders, of Ealing, were summoned for erecting a wood and iron verandah, contrary to section 26, and without due notice to the District Surveyor.

The case was before the Court on September 30 last, when Mr. Cheston, the District Surveyor, agreed to an adjournment to enable the defendants to apply for the sanction of the London County Council.

Mr. Cheston stated that he found no application had been made to the Council, and also that he had received no communication of any kind since the adjournment respecting the structure.

Evidence having been given as to the irregularity, the Magistrate made an order for removal, and inflicted a fine of 5*l.* and costs in respect of the neglect to give notice.

MEETINGS.

FRIDAY, NOVEMBER 18. Architectural Association.—Mr. Paul Waterhouse on "Some Mysteries of Modern Architecture." 7.30 p.m. Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. F. J. Sykes on "The Nature of Nuisances, including Nuisances the Abatement of which is Difficult." 8 p.m.

MONDAY, NOVEMBER 21. Royal Institute of British Architects.—(1) General Business Meeting (for members only). (2) Special General Meeting for the election of an Honorary Secretary. (3) Paper by Mr. John D. Crace on "Picture Gallery Decoration." 8 p.m. Society of Arts (Lecture Lectures).—Professor Vivian B. Lewis on "The Generation of Light from Coal Gas." 8 p.m. Leeds and Yorkshire Architectural Society.—Address by the President, Mr. George B. Balmer, F.R.I.B.A. 7.30 p.m.

TUESDAY, NOVEMBER 22. Institution of Civil Engineers.—Discussion on the following papers—(1) "Latex Graving-Dock, Nova Scotia" by the Hon. R. C. Parsons, M.A. (2) "Coconut Island Graving-Dock, New South Wales," by Mr. E. W. Young. (3) "The Alexandra Graving-Dock, Belfast," by Mr. W. Redfern Kelly. (4) "Construction of a Concrete Graving-Dock at Newport, Monmouthshire," by Mr. Robert Pickwell. 8 p.m. Sanitary Institute (Lectures for Sanitary Officers).—Professor A. Bostock Hill on "Trade Nuisances." 8 p.m. Glasgow Architectural Association.—Smoking Concert and Exhibition of Drawings.

WEDNESDAY, NOVEMBER 23. Society of Arts.—Mr. F. Seymour Haden on "Cremation as an Incentive to Crime." 8 p.m. Liverpool Engineering Society.—Mr. George F. Deacon on "The Vinyu Works." 8 p.m.

THURSDAY, NOVEMBER 24. Institution of Civil Engineers.—Students' visit to the Gas Light and Coke Company's Chief Offices, Horse Ferry Road, Westminster. 2.30 p.m. Society of Antiquaries.—8.30 p.m.

FRIDAY, NOVEMBER 25. Sanitary Institute (Lectures for Sanitary Officers).—Professor A. Wynter Blyth on "Sanitary Law, English, Scotch, and Irish: General Enactments; Public Health Act, 1875; Model Bye-Laws, &c." 8 p.m.

SATURDAY, NOVEMBER 26. Artists' Benevolent Fund.—Annual Dinner, Sir Edward Clarke in the chair. Criterion, 7 p.m.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

19,887.—HANGING OF DOORS AND SHUTTERS: A. McVerney.—This invention relates to a method of hanging doors and shutters to facilitate the easy and safe opening or closing of the same. The doors are suspended from pulleys running in grooves above, and their lower edges slide in a groove in the floor. By an inclination given to the grooves an automatic

movement rack is secured, and springs entirely dispensed with.

4,878, SANITARY PIPES AND DRAINS: W. Sterlin.—By this specification the inventor proposes to effect the sockets of the same length as at present, or preferably longer, and partially larger in diameter, and to thicken the spigot ends of the pipes to form a raised lug or end at a short distance from the end of the spigot, or to make the spigot ends of such thickness as to admit of recess or groove formed around it. He claims an enlarged spigot, in conjunction with the pipe-socket, and a thickened spigot. Such pipes may be made of any material or of any size desired.

14,871.—STARTING SYPHONS OF FLUSHING CISTERNS: W. B. H. Drayson.—This invention has for its object the prevention of the "gurbling" sound caused by entrances of air into the siphon of castern siphons which it proposes to obviate by providing a whereby an air-valve can be supplied to the mouth or bell of a siphon without opening when the bell is moved, which is effected by an arrangement of crank levers, counterbalance weights, &c.

15,641.—ROOFS OF HORTICULTURAL AND OTHER BUILDINGS: H. J. Pullen-Barry.—This invention relates chiefly to the construction of glass-houses, and it consists in certain improvements in the arrangement of lights or frames which are arranged in the roof in a ridge for ventilating and other purposes, which are effected by improvements.

9,248.—STENCIL-PLATES: C. Thomson.—This specification describes stencil-plates of whatever material having their surface roughened with lines, grooves, or other projections, and modifications, such as "milled" metal or vulcanite, and a stencil-plate may be "cross," "point," or "single line," &c., and glass plates the surface may be roughened by a desirable means. Instead of using the ordinary wire or steel-plate when writing on the stencil-plate a style having a small steel ball or roller at its end may be used.

17,477.—DRAIN-TESTING APPLIANCES: J. Sybell & Williams.—This invention consists of an article which can be placed a small glass tube, containing a required chemical, such as essence of peppermint or like, and this article can be floated down past the trap of any drain for a given distance, when, by pulling the string which is attached to the same, the glass will be broken and the strong-smelling chemical deposited in the drain, when, should there be any in the drainage system, the same will be discovered by the escape of the odour of the chemical. In order to effect this the patentees form a case of thin sheet metal containing a glass tube charged with the chemical. This case is provided with a handle and lever, and is attached to a string. When it has been placed in a drain and has been washed down to the length of the cord, the catch is released, and the spring arm breaks the tube and liberates the contents.

19,476.—SASH WEIGHTS: T. Smith.—By this invention the sash-weight is made in separate lengths, the upper length being the ordinary eye at one end of the sash-cord, and at the other with a tongue or with sunk recesses opening through one side to receive corresponding outside projections upon a single eye cast on the upper end of the same way, so that when lengths being cast in the same way, and being linked to each other they form a hinge-jointed chain of weights, which, when in the window-box or casing, cannot become detached from each other. This invention is applied in proportion to weight and facility is afforded for altering the weight by linking separate pieces together.

21,195.—COWL OR WIND-GUARD: M. Newberry.—This patentee claims a cowl or wind-guard, comprising a pivoted ball or larger diameter than the mouth of the chimney-shaft or equivalent, and counter-weight

MIDDLETON (Lancs).—For sewerage, levelling, paving, &c. James, Leaton, Sarah, and Wellington streets, for the Corporation. Mr. W. Wilson, Borough Surveyor, Town-hall, Middleton. Quantities by the Borough Surveyor.—
E. Parkinson & Son, Middleton, Manchester (accepted as a schedule of prices on quantities).

NEWCASTLE.—Accepted for additions and alterations to store, Howdon-Weir, for the Crook Co-operative Society, Limited.—
John Hare, Crook..... £115 0 0

NORTHAMPTON.—For erecting a villa residence at Coppenhoe near Northampton, for Mr. Thomas Mann. Mr. H. H. Dyer, architect, Northampton. Quantities by the architect.—
W. Berrill..... £1,288 | W. Head..... £1,940
Sharp & Son..... 1,574 | J. Wingrove, Northampton* 1,188
* Accepted.

NORTHAMPTON.—For the erection of a new corn store at Northampton, for Mr. J. Thompson. Mr. H. H. Dyer, architect, Northampton.—
Woodfor & Son..... £725 0 | J. Cotts..... £545 0
W. B. Radmore..... 710 0 | Geo. White..... 644 0
A. P. Hawkins..... 700 0 | J. Duckey..... 637 10
Green River..... 634 0 | J. G. Carr, redt. Kingsley..... 634 0
J. Wingrove..... 674 0 | [All of Northampton.]

NORTHAMPTON.—For painting and decorating villa residence at Coppenhoe, Northampton, for Mr. T. Mann, Jun. Mr. H. H. Dyer, architect, Northampton.—
J. Wingrove..... £128 | R. Cleaver (accepted)..... £119
W. Ashton..... 119 | [All of Northampton.]

NORTH MINNS (Herts).—For building Christ Church, Little Heath, North Minns. Herts. Mr. W. H. Seth Smith, architect, John-street, W.C.—
Fittings.
Brisley..... £2,876 0 0 £299 0 0
Dries..... 2,715 0 0 159 0 0
Dove Bros..... 2,575 0 0 25 0 0
Wright & Sons..... 2,528 0 0 165 0 0
B. E. N. Bingham..... 2,514 0 0 169 0 0
J. Smith & Son..... 2,485 0 0 169 0 0
Southall & Son..... 2,460 8 4 185 0 0
Cornish & Geymer..... 2,383 0 0 137 0 0
Moody..... 2,183 0 0 137 0 0

PETERBOROUGH.—For alterations and additions to the Board School, Helpton, for the School Board. Mr. H. M. Townsend, architect, Peterborough. No quantities.—
Pier & Sellall..... £653 0 | J. Crowson, Deeping..... £333 19 0
D. Gray..... 587 8 | St. James*.....
W. Cave..... 592 10 | * Accepted.

POOLE (Dorset).—For roadmaking works, Emerson and Herbert roads, for the Town Council. Mr. John Rford, Borough Surveyor, Kils-street, Poole.—
W. H. Saunders & Co. £221 14 | G. T. Budden, Kinson* £159 0 0
T. C. Bigler..... 175 0 0 | * Accepted.

PORT TALBOT (Gloucestershire).—For erecting an intermediate and technical school. Mr. T. F. P. Smith, architect, Heathfield-street, Swansea. Quantities by the architect.—
W. K. Rees..... £1,500 0 | D. C. Jones..... £3,870 0
Morgan Cox..... 4,200 0 | Thomas Watkins & Co. 3,547 7
David Jenkins..... 4,300 0 | E. Thomas..... 3,547 0

ROTFERHAM.—For the erection of school buildings, St. Ann's Basil School, for the School Board. Mr. H. L. Tacon, architect, Westgate, Rotherham. Quantities by the architect.—
Cradwick & Co. £7,715 | A. T. Ripley..... £7,440
C. Green..... 7,904 | Robt. Beall, Rotherham* 7,376
Thornton & Son..... 7,904 | [Accepted]

STANFORD-LE-HOPE (Essex).—Accepted for alterations at Ivy Walls Farm for Mr. E. Dray.—
Maxwell Bros, Limited, 185, Upper Thames-street, E.C. 3 0 0
[No competition.]

TORQUAY.—For sewerage works, Bellevue-park and Avenue-road (contract No. 1 and 2), for the Local Board. Mr. H. A. Garrett, Surveyor, Town Hall, Torquay. Quantities supplied.—
Contract No. 1.—Avenue-road Surface Drainage.
T. Shaddock..... £1,045 11 2 | W. Davey..... £888 9 8
T. Shaddock..... 963 17 8 | W. C. Shaddock..... 677 11 2
G. Green..... 963 17 8 | S. Park, Upton, Torquay* 672 13 0
J. Thorne..... 730 3 4 | [Accepted]
F. Matthews..... 730 3 4 | (Surveyor's estimate, £701, 6s. 6d.)

Contract No. 2.—Bellevue-park Sewer.
Geo. Green..... £911 7 6 | J. Tuser..... £310 4 1
T. Shaddock..... 720 0 0 | J. Matthew, Babbacombe* 505 19 0
W. C. Shaddock..... 489 5 0 | [Accepted]
J. Shaddock..... 489 5 0 | (Surveyor's estimate, £230, 12s. 4d.)

SEVENOAKS.—For roadmaking and sewerage work at Bardley-road, for the Local Board. Mr. James Allan, Surveyor, Local Board office, Aylesford, Sevenoaks.—
Edmund Lee..... £1,208 7 11
Sidney Hudson, West Dick wharf..... 1,030 19 3
Woodhouse & Fry..... 1,032 15 3
* Accepted on basis of schedule of prices.
(Surveyor's estimate, £1,317.)

WELLINGBOROUGH.—For the erection of a school and mission room, Little Rochester, for the Vicar of Rochester and Trustees. Mr. H. H. Baker, architect, Silver-street, Wellingborough. Quantities by the architect.—
W. Russell..... £225 0 | J. Underwood..... £295 0
E. Sharpe & Son..... 314 0 | Hy. Gorman..... 266 10
E. Sharpe & Son..... 280 0 | J. Murfitt..... 238 0
H. G. Berrill, Rochester..... 265 0 | W. Stevens..... 229 4
* Accepted.

WILLESDEN.—Accepted for road-making and paving works, Cricklewood, Willesden, and Harpenden, for the Local Board. Mr. G. Claude Robson, Engineer, Public Offices, Bylane-road, Kilburn, N.W.—
Hemmers-road
Fairlight-avenue..... £789 0 0
Harcroft-avenue..... 442 0 0
Gaskelde-road..... 823 0 0
Lockhall-road..... 383 0 0
Bridge-road..... 774 0 0
Taylor-avenue..... 1,056 0 0
Golf-lane..... 377 0 0
H. Ballard, Chip's Hill..... 337 0 0
[Total for the whole, £5,383.]

WORSBOROUGH (Yorks).—For supplying and laying 100 yards of 5 1/2 in. water-mains, for the Local Board. Mr. John Whitaker, Surveyor, Local Board Office, Worsborough.—
Wm. Goss..... £212 | Higgin & Porter..... £180
Geo. Hall..... 172 |

Alterations at the "Mitre" Tavern.—Mr. F. H. Hopkins writes to say that the amount of his tender for this work (see col. 2, p. 387) was 493/-, not 193/-, as it seems to be in part of our impression last week. As a matter of fact, the apparent mistake is due to the circumstance that the figure "4" had become damaged in printing.

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We cannot undertake to return rejected communications.
Letters or communications (beyond our newsworthy items) which have been duplicated for other journals, are NOT DESIRED.
All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

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London Agent—Mr. E. A. WILLIAMS, 16, Craven-street, Strand, W.C. [Adv.]

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Asphalts.—The Sossal and Metallic Lava Asphalt Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. Asphalt Contractors to the Forth Bridge Co. [Adv.]
QUANTITIES, &c., LITHOGRAPHED accurately and with despatch.
METCHIM & SON, 20, Parliament-st., S.W. "QUANTITY SURVEYORS' TABLES AND DIARY." Revised and Enlarged for 1892, price 6d., post 7d. [Adv.]
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LIVERPOOL: 6 and 8, Hatton Garden.
GLASGOW: 47 and 49, St. Enoch-sq.

The Builder.

Vol. LXIII. No. 2560.

NOVEMBER 26, 1882

ILLUSTRATIONS.

Interior of Turkish Bath, Avery Hill.—Mr. Thomas W. Cutler, F.R.I.B.A., Architect	Double-Page Ink-Photo.
Window for Burford Church, Tebury.—Drawn by Mr. G. W. Rhead, from the Design of Mr. James Powell	Double-Page Ink-Photo.
An Artist's House at Croydon.—Mr. Charles Henman, Architect	Single-Page Ink-Photo.
Houses, Nos. 39 and 40, Margaret-street, Cavendish-square.—Mr. Frank L. Pearson, Architect	Single-Page Ink-Photo.
Norbury Church, Shropshire: Proposed Chancel, &c.—Mr. W. J. H. Leverton, Architect	Single-Page Photo-Litho.
Library Fireplace, Kiplin Hall, Northallerton.—Mr. James H. Hondrey, Architect	Single-Page Photo-Litho.

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The Advertisement Mania.



IN the amusing little farce which was provided by an eminent French architect for the after-dinner entertainment of a congress of his professional colleagues at Paris two or three years ago, a bill-sticker was introduced among the *dramatis persone* who, in a song in character, represented himself as the personage who supplied modern architecture with the important and much-neglected element of polychromatic decoration. That his element is more than usually deficient in modern Parisian architecture must be admitted, and perhaps in this instance M. de Gasparin's little satire was intended to be two-edged, and was directed against the rim baldness of Parisian architecture in the matter of colour as much as against the only method supplied by the fashion of the day for correcting this defect. In the earlier days of the present generation a similar sarcasm might have been directed against London architecture, when it was splendid in cement. There has been an improvement since then, and the recent preference for a warm red brick, with the occasional use of tile or faience decoration, has brought more of warm and agreeable colour into our new street architecture than was ever thought of five-and-twenty years ago. With this excuse, therefore, than in Paris, the polychromatic advertiser has nevertheless persecuted us even worse; the nuisance is getting more gigantic every year; and it is no wonder that there are signs of a determined up-rising against it on the part of the minority who still retain some regard for the preservation of town and country from ubiquitous disfigurement.

We may feel gratified that it is by an eminent architect that the movement of revolt against the advertiser has been started in the columns of the *Times*, and it is natural that architects should be especially sensitive to the abuses of a system which disfigures our streets and fills them with vulgar associations at every turn; and yet it

is not this so much as the invasion of rural scenery by the advertiser which has stirred up Mr. Waterhouse to head a demonstration which we hope may not be without some practical and permanent result. And this is in fact the worst part of the plague, not only in itself, but in the increased difficulty of dealing with it. In our towns, and in London especially, the rage for large, staring, claptrap advertisements has grown to such a pitch that, although we should wonder at the change in the aspect of our streets if these were all removed—wonder, perhaps, how we ever came to endure them for so long—yet the eye has become so used to it that we have almost ceased to be struck by it until attention is specially called to its hideousness. It is when we find the same senseless disfigurement intruding itself into the country, flaring in the middle of fields or on the side of a hill in a picturesque scene, that the nuisance and vulgarity of the practice is forced upon us in a manner that becomes absolutely intolerable; and it is this comparatively new phase of the advertising mania which has specially drawn from Mr. Waterhouse his indignant and well-timed protest. But not only is this rural advertising the worst form of the nuisance; it is also the one most difficult to deal with. Our cities are under municipal control to a great extent; it is recognised there that practices which are injurious to the general community must be checked or brought under regulation, and there is plenty of precedent for the operation of by-laws to this end. The recent legislation against sky-signs is a wholesome example of this, although it must be remembered that this enactment was directed not so much against disfigurement as against a recognised danger to the public, and had it not been for this consideration it may be doubted whether the Sky-Signs Act would have been so readily passed as it was. But when we come to advertisements which disfigure the open country this argument of danger to the public disappears; the question of disfigurement alone remains, and there is no precedent such as building by-laws afford in a town, for controlling to some extent each man's treatment of his own property. And there are further possibilities of advertising contemplated by modern ingenuity which would be even more difficult

to deal with. Mr. Waterhouse makes no allusion to it, but we have observed several times in the daily papers lately the advertisement of a speculator who undertakes by means of electric light (if we remember right) to display advertisements on the clouds at night, thus threatening to deprive us of the last and only refuge of the wearied eye from the exploits of the advertiser. Happily this ill-omened notion has not yet, as far as we know, been carried into practice; but if it is, how are we to bring legislation to bear on that? Whose property is the sky, and under what by-laws is its use controlled, unless we take a hint from the *Nephele-koocuryia* of Aristophanes, in which a certified surveyor offered to make a measured survey of the air?

The greatest evils of the town advertisements are the enormous size of many of the pictorial advertisements especially, and in most cases the vulgarity of the designs, both in regard to colour, form, and sentiment. The evil of size is not only that it so much increases the obtrusiveness of advertisements, and continually tends to increase the demand for space for them, but also that in the case of figures, and especially of the colossal heads frequently introduced, it lowers and belittles the scale of street architecture, a mischief which architects are especially quick to perceive and condemn. As to the artistic style of these advertisements, they are really a serious influence in keeping the taste and perception of the poorer classes of the public, who see little of better pictorial art, at a low level, and daily familiarising their eyes with vulgar ideas expressed in vulgar drawings. It has been more than once suggested that this power of the advertisement picture to influence public taste should be turned to good account; that capable artists should be encouraged to make designs for advertisements, and that these should be drawn in a strong bold outline instead of the glaring colours in which they are generally set forth. The suggestion was last made, we believe, in a paper read by Mr. Heywood Sumner at the Birmingham Fine Art Congress in 1890; and most of us can remember one or two stray instances (before that date) in which this course was taken with remarkably good results, as far as the appearance of the advertisement was concerned; whether the picture answered its practical purpose any better

THE vexed question of the length of time for which the return half of a railway ticket should be available still remains unsettled; but we learn that the North-Eastern Railway Company are about to deal with another grievance by introducing a system of enabling passengers to break their journey when desirous of doing so. As far as we are aware, a journey can only be broken at an intermediate point in the case of tourist tickets, and of a few long distance journeys; and even in these cases the privilege is hedged about with so many "exceptions" and other restrictions, that the mastery of the regulations often involves quite a study of the "Guide" before setting out. The North-Eastern propose to allow all ticket-holders to break their journey at any station short of their destination, providing it is resumed within the time for which the ticket is available. The ticket is to be given up at the station at which the passenger leaves the train, and a voucher will be given in exchange, which will, in turn, be exchanged for the original ticket when the journey is resumed. The necessity for some such protection against the abuse of the privilege is obvious, for there are many who would not hesitate to use the ticket over again from the starting-point if they had the opportunity. Nor would this method of defrauding a railway company be confined to the habitually dishonest; for, unfortunately, experience shows that to successfully "steal a march" upon a railway company is often regarded with pride by persons who would strongly resent any imputation upon their general rectitude. It is, of course, partly due to this sort of thing that the unwelcome restrictions upon the use of return-tickets are found to be indispensable. Thus the sins of the dishonest and overreaching are visited upon the whole travelling community.* The North-Eastern commence their experiment on December 1, and we understand that it will apply to the whole of their system, with the exception of a few short branch lines.

THE verdict of manslaughter against the signalman in the Thirk accident was a foregone conclusion, though of course there are many extenuating circumstances. It appears to us that the railway company have a heavy responsibility on them for having neglected to relieve a man on such a post who himself protested that he was in an unfit state for his work, especially as it is admitted in evidence that if really unable to get a substitute they might have closed the cabin for a time, which would merely have involved substituting a long "block" for two short ones. The cry that has been made, under the excitement about the accident, that there ought to be two signalmen in every cabin, is we think unreasonable. Such an arrangement would in ninety-nine cases out of a hundred be a waste of wages and men's time, and might lead to irregularities and neglect of duty in other ways.

THE Nottingham Trade Protection Society have forwarded a memorial to the Lord Chancellor calling attention to the unsatisfactory state of the law in regard to rights of light. They complain that rights of light are often asserted and made use of in a manner which is not for the good of the community; that a fictitious value is often put on windows and openings that are of small value, and that the owner rebuilding has often no means of ascertaining what will satisfy his neighbour until an action is brought for compensation. The memorial continues:—

"In order to prevent this uncertainty, your Memorialists are of opinion that it is desirable a local
* Curiously enough, since the above was written a case was brought before the South Shields magistrates on Monday last, in which a booking clerk and an assistant-guard were convicted of defrauding the North-Eastern by re-issuing tickets which had already been used. This case furnishes a good illustration of the difficulties in the way of railway companies in extending the limit of time for which return-tickets should be available; and it will be seen that other elements enter into the question besides the cupidity of inscrupulous passengers.

authority in each town should be constituted, to whom either party might apply, and who should have authority on the spot to examine the old building if standing, or the new one if erected, or the plans if not so erected, and who should be authorised to decide the size of the proposed openings, the height of proposed buildings, or otherwise.

"Your Memorialists hesitate at this stage to enter more fully into the constitution of such local authority, but they respectfully ask that your Lordship will give attention to the matter with a view to the bringing into Parliament a Bill, so as to secure the objects indicated."

AT the beginning of a winter in which the most urgent wants of our unemployed will probably have to be carefully considered, it would be well to direct attention to an institution at Vienna which has proved itself highly efficient in the cheap victualling of masses. The Vienna *Volkskuechen Verein*, of twenty years' standing, is a self-supporting concern, the necessary capital for the organisation and development of which has, however, been voluntarily subscribed from time to time. There are six permanent stations in the hands of the managers, in the dining halls of which stations no less than 2,342,000 portions of cooked victuals were supplied last year, whilst the kitchens have at times had to bear such special strains last winter as the preparation of an extra 200,000 meals for School Board children, the distribution of which is also in the hands of the *Verein*. Architects will find the new headquarters of the institution an interesting building. A main feature in its plan is the position of the kitchen in full view of the dining hall, to prevent any prejudice on the part of diners against the modes of cooking adopted. The institution has cooking apparatus for soup, which will hold 1,500 litres at a time, and specimens of nearly every kind of cooking apparatus used abroad can be found in the different stations.

WE have already noticed how Vienna has been doing honour to the memory of the great architects who helped to beautify the Austrian capital. We now hear of another monument to the late Von Schmidt, which is to be placed on a public square at the back of the deceased architect's fine Town Hall. This monument is to cost about 25,000 florins, and a competition has been opened to sculptors for the design.

THE *Æoria* (No. 40) announces that at Mycenæ fresh discoveries have been made that promise to be of great importance. Some graves have been opened which contain "carved work," to give a literal translation of the somewhat vague expression (*γλυφά*) employed. Possibly works something of the same kind as the early Mycenæ gravestones may be intended; on the other hand, they might quite well be terra cotta plaques like those discovered by Dr. Waldstein at Argos. More tantalising still is the news that inscriptions have been found which are not easily decipherable. Does this mean that they are illegible from age and had preservation, or are they in unknown characters? The grave contained also weapons of very early date, gold and silver coins, and many other important objects. We can but wait for further news. Surely, with all these discoveries, some light must be cast on the still vexed "Mycenæ" question. But can that question be satisfactorily answered while Crete yet remains hut half, or not half, explored?

THE monument to Fawcett, for Vauxhall Park, modelled by Mr. Tinworth and executed by Messrs. Doulton, has been on view during the week at the show rooms on the Albert Embankment. The monument consists of a seated figure of Fawcett on a rectangular pedestal, with a winged figure standing behind and holding a wreath over his head. On the sides of the pedestal are bas-reliefs in panels, representing abstract qualities, "Courage," "Justice," &c., alternating with partially idealised figures connected with the idea of postal service, "Good

News," "Bad News," &c. The principal figure we consider a decided success; it is simple and unaffected in pose, it is a good likeness, and there is something at once noble and pathetic in the expression of the head. With the rest we fear we cannot feel so much sympathy. The angel produces on one's impression beyond that of intense respectability and propriety; Mr. Tinworth has never acquired, and we fear never will acquire, that feeling for elevation and style in an ideal figure without which such a figure is no more than a kind of cemetery property, an angel like a housekeeper with wings added. Nor are the bas-reliefs successful; like the angel, they are, both in conception and execution, deficient in the subtle quality of "style," so readily felt and recognised where it exists, so difficult to define. Mr. Tinworth's power lies in dramatic realism in presenting scenes or figures in real life, present or past. His series of little studies from the history of Joseph, which is to form part of the Doulton exhibition at Chicago, is most interesting and spirited, and there Mr. Tinworth is seen at his best, in his power of expressing the combined action of a group of figures. Messrs. Doulton have a fine show of pottery for Chicago, including some beautifully executed work from their Burslem factory, where a special style of design is carried on approximating somewhat to the spirit of Sèvres ware, and which represents most beautiful and delicate workmanship, though in point of artistic feeling and originality it is not equal to the better known class of work turned out at Lambeth. Among the novelties is a tile surface without glaze intended for the execution of decorative pictures for walls, which deserves attention getting rid of the disagreeable glitter which is the drawback to tiles as a wall decoration. We may take the opportunity of calling attention to the sgraffito frieze on the exterior of the works, representing figures engaged in processes of terra-cotta work, which has been treated successfully in bold and simple lines, and is an effective piece of exterior decoration.

A CORRESPONDENT draws attention to the fact that Fergusson, in the original edition of his "History of Architecture" (1850—then called the "Handbook of Architecture"), made the very suggestion about the date of the rotunda of the Pantheon which is now established. He there said

"I feel convinced that the rotunda is very much more modern than the portico." He gives some reasons for the opinion, and adds, "all these considerations would incline me to place it very near the age of Constantine, could I find any trace of a later restoration than that above alluded to" (by Septimius Severus), "but under any circumstances I do not think it can have been erected before the age of Hadrian."

In the edition of 1874 he states that further examination "had forced him very unwillingly to abandon this hypothesis."

THE School Board for London have issued their annual schedule of sites which they propose to take for new schools, or the enlargement of their existing school-houses. The parcels of land are twenty-four in all, in respect of eighteen schools; the alternative sites on this occasion being more than usual. Taking a mean for each group of alternative sites, we find that the net total area of ground scheduled is about 43,959 square yards, or 9 acres 14 poles, distributed amongst the local divisions as follows:—Chelsea: a plot of 1½ acre in Fulham Palace-road, near St. James's Home, and being a further portion of Bagley's Market-garden—one. Finsbury: fourteen houses, with land, in Gooding and Hungerford roads, seven houses and gardens in Ecclesbourne-road, three houses and gardens in Thornhill-road, and three alternative sites, already built over, in Orpingley, Seven Sisters, and Hornsey roads, all in St. Mary, Islington, parish,—four. Hackney: eighteen houses in Montague and Victoria roads, a piece of land behind West-street, these two sites being in

St. John's parish; three houses in Boston-street, Shoreditch, and eight in Tyrrell-street, Bethnal Green,—four. Tower Hamlets: two houses in Orchard-place, Poplar,—one. Greenwich: Two pieces of land in Anchor and Hope-lane and Fossdene-road, Charlton, two adjacent and alternative sites, built over, in Blackheath-road, Greenwich; two alternative plots, mostly garden ground, in Spernazet-street and Conway-road, Plumstead; and five houses in Hughes-fields, Deptford,—five. East Lambeth: two alternative sites, being Friern-nursery, Peckham-rye, and some land belonging to the Orphanage in Barry-road,—one. West Lambeth: two alternative plots in Harroway-road and Eichelburga-street, Battersea, and one lying between the river-wall and the "Sbafesbury" play-ground at Gray's, Essex,—two. No sites are marked this year in St. Marylebone and Southwark divisions; and last year a site in the Finsbury, and one in the Marylebone, divisions, were alternative.

THE current volume of the Transactions of the Institution of Civil Engineers contains some particulars as to the generation of impurities into service pipes conveying water under pressure. Mr. G. Oeston states that it is a commonly-received opinion that pipes conveying water under pressure never permit of the entry of impurities from the soil. This is an erroneous view, for cases are possible in which a hole in the pipe may, owing to the direction, give rise to an action resembling that of an injection, and cause external impurities to be sucked into the water-supply. This will take place if the direction of the aperture is obliquely inclined towards the current, supposing the flow in the pipe reach the required velocity. These circumstances have actually arisen in connexion with a house-supply in Berlin. The imperfection occurred in a stop-cock, the exterior of which became worn through. When the plug was in certain positions an incline slit was formed, through which sand and grit were drawn into the main. These gave rise to a deposit, which so much injured taps and fittings as to cause an investigation, which ultimately led to the detection of the injury.

SOME interesting experiments have been made in Germany in order to ascertain whether fish will live in the effluent water of a sewage farm. The investigations were carried on at the Berlin Sewage Farm at Malchow, and are described in the *Gesundheits-Ingenieur*. It had been noticed that the effluent water supported numerous mollusks, and this led to some trout fry and young char being placed in ponds containing the effluent water. The young trout flourished for a time, but the accidental breaking of a dam led to their escape into Lake Malchow. This was in 1889, and in 1890 six new experimental ponds were constructed and stocked with varieties of fish, and subsequently two larger ponds were constructed. From the first constructed of the ponds 150 trout were taken, weighing altogether 70 lbs. These were served up at a banquet at the Berlin Town-hall. Afterwards the ponds were netted, and yielded in all 2,588 fish of various kinds. The experiments are of considerable interest, and we are glad to hear they are likely to be continued, when means will be taken to ascertain the increase in size and weight of the fish.

A CURIOUS double advertisement appeared in the marriage column of the *Times* this week, announcing the marriage of the same two people at nineteen years difference of date. Our only reason for mentioning it is that the bride, "Marie Amelie Gordon McDonnell, nee Churcher," is described as "grand-daughter of James Deacon, architect and builder of the Athenium Club, Pall Mall." We have never heard of this person before, and there is something at fault in Mrs. Tritton's architectural pedigree. As is well known, the architect of the Athenium Club was Mr. Decimus Burton.

THE ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD.

THE "Twenty-First Annual Report of the Local Government Board, 1891-92," recently published, is, it is needless to say, full of suggestive reading for administrators, economists, and sanitarians. It is divided into four sections, viz., I., "The Local Government Act, 1888, and County Councils;" II., "Relief of the Poor and the Poor-Rate;" III., "The Public Health and Local Administration;" and IV., "Local Taxation and Valuation." The Report itself (which is signed by Mr. Ritchie, the late President of the Local Government Board) occupies 180 pages, and its statements and conclusions are backed up and amplified by appendices occupying more than 600 pages in addition. These appendices deal with a great variety of matters coming under the control of the Local Government Board and that of the various local authorities, and contain much interesting information.

The first section of the report deals, as we have said, with the relations of the Local Government Board and County Councils. The two preceding reports of the Board contained some account of the first two years' work done under the Local Government Act, 1888, after April 1, 1889, at which date the County Councils came into office. The first section of the present report deals with the work of the third year of the new administration. Into the intricacies connected with the re-arrangement and re-adjustment of authority, power, and financial liability with regard to many matters of administration we cannot here enter; but it is satisfactory to gather that many apparently insuperable difficulties have been surmounted, and that things are beginning to work smoothly, thanks largely to the adoption of a conciliatory give-and-take policy by the authorities concerned.

The second section of the Report, which deals with the "Relief of the Poor and the Poor-Rate," informs us that on January 1, 1892, the total number of paupers of all classes in England and Wales in receipt of relief was 761,473, of whom 198,934 were indoor, and 562,520 outdoor paupers, while 219 received both indoor and outdoor relief. As compared with those of January 1, 1891, these figures show an increase of 890 in the indoor, a decrease of 19,919 in the outdoor paupers, and an increase of 45 in the number of those receiving both indoor and outdoor relief. The decrease on the total number of paupers was 18,984, or 2 1/2 per cent. Taking the revised estimates of the Registrar-General of the population of England and Wales, in the middle of each of the years 1890 and 1891, as the basis of calculation for the purpose of ascertaining the proportion to the population of the paupers relieved on January 1 of the two years 1891 and 1892 respectively, it appears that the total number of paupers amounted approximately in the former year to 1 in every 37 persons, and in the latter year to 1 in every 38 persons. The county which contained the largest proportion of paupers on January 1 last was Norfolk, in which no fewer than 46.4 out of every 1,000 of the population were in receipt of parish relief. The counties in which there were fewest paupers on that day in proportion to the population were the West Riding of Yorkshire and Lancashire, where they amounted only to 18.0 and 18.2 per 1,000 respectively. In these two manufacturing counties the proportion was not half as great as it was in Norfolk, Dorset, North Wales, Wilts, Hereford, Somerset, Devon, Hertford, and Oxford, which are mainly agricultural counties. In Norfolk no fewer than 39.2 out of every 1,000 of the inhabitants were receiving out-door relief. In the Metropolis the proportion was 11.3 per 1,000. In Lancashire it was 11.7, and in Warwick 12.9. From a table which is given in one of the appendices to the Report, it appears that the mean number of paupers relieved in the parochial year ended at Lady-Day, 1892, was smaller than in forty-one out of the forty-three preceding years, and that, in proportion to the population, it was smaller than in any other parochial year included in the table. It amounted to 744,757, or about a thirty-ninth part of the estimated population. In 1849, the first year in the table, the mean number was 1,088,659, or a little more than a sixteenth part of the estimated population at that time. The greater part of the decrease in

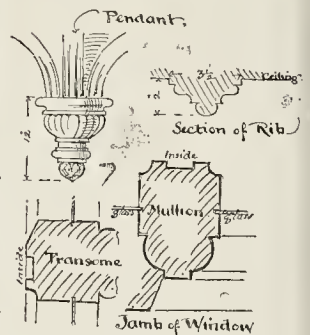
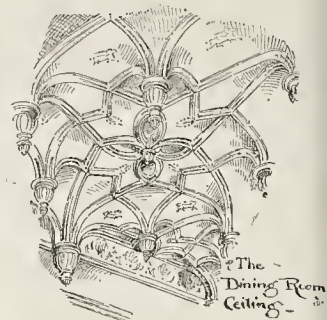
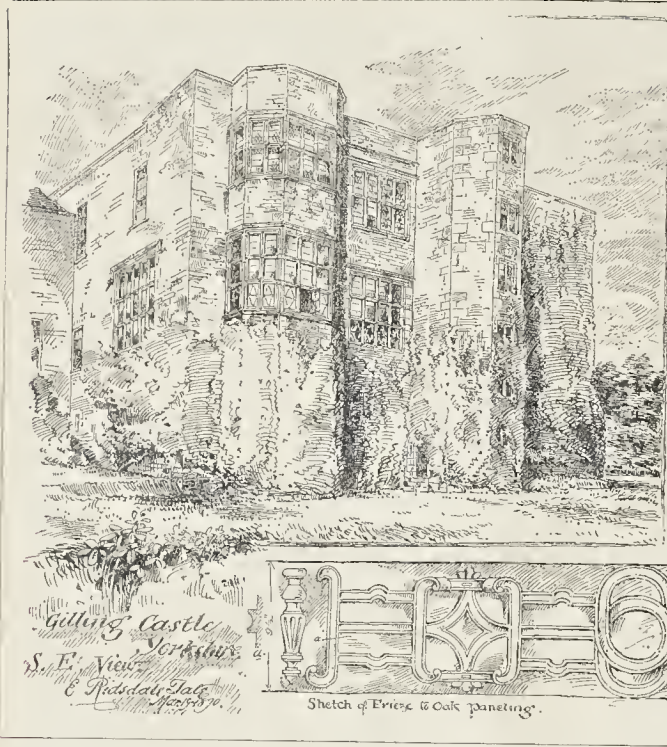
pauperism evidenced by these figures is attributable to a reduction in the numbers of the outdoor paupers; "for whereas the ratio which the mean number of the indoor paupers bore to the population had only decreased from 7.7 per 1,000 in 1849 to 6.4 per 1,000 in 1892, the ratio which the mean number of the outdoor paupers bore to the population had fallen from 55 per 1,000 in 1849 to 19.2 per 1,000 in 1892." Another noticeable and satisfactory feature in connexion with the decrease in pauperism is that whilst the number of outdoor paupers was smaller in 1892 than in any of the forty-three preceding years, the ratio of indoor paupers to the population was less in 1892 than in any year since 1878.

The third section of the Report, dealing with "The Public Health and Local Administration," is of more immediate interest to the majority of our readers. Financially, it appears that the total amount of the loans which were sanctioned by the old General Board of Health under the Public Health Act, 1848, up to September 1, 1858, when the Local Government Act, 1858, came into force, was 2,955,178. The sanctions granted by the Secretary of State under the latter Act and the Sewage Utilisation Act, 1865, prior to August 19, 1871, amounted to 7,563,366. Since the constitution of the Local Government Board on August 19, 1871, that body has sanctioned the borrowing, by Urban and Rural Sanitary Authorities, of no less a sum than 50,043,590. During the year 1891 sanction was given to the borrowing of 3,281,037,—a considerably larger amount for one year than was authorised to be borrowed during the ten years which intervened between the passing of the Public Health Act, 1848, and the Local Government Act, 1858. By far the greater proportion of the aggregate of upwards of 60,000,000, which is thus accounted for as the total of sanctioned loans has been borrowed for the purpose of sanitary improvements in Urban Districts, to be executed under the provisions of the Sanitary Acts, the Public Health Act, 1875, and Local Acts and Provisional Orders. The remainder has been sanctioned principally for the execution of sanitary improvements in Rural Districts, or for improvement schemes in Urban Districts under the Artisans' and Labourers' Dwellings Improvement Act, 1875, and the Housing of the Working Classes Act, 1890. It is impossible, within the limits of our space, even briefly to summarise the particulars given of the important work in many branches of sanitation with which the Local Government Board is administratively concerned, so we pass over much that is of interest until we come to the paragraphs which refer to the supply of water to the metropolis, a subject which is now being inquired into by a Royal Commission. Our pages for some months past have contained reports of the proceedings of that Commission, so that our readers have been kept well-informed of all the aspects of the question, but we nevertheless think it may be useful to quote here a few passages on the subject from the report now under notice. Our quotations will, at any rate, serve to counteract somewhat the exuberant optimism of some of the witnesses before the Commission. Says Mr. Ritchie in the report:—

"The reports of the Examiner under the Metropolis Water Act (Major-General A. de Courcy Scott, R.E.), and of the Analyst (Professor Frankland, F.R.S.) of the water supplied by the eight Metropolitan Companies in 1891, are appended (pages 219 and 251). As to the quality of the water, Professor Frankland reports that he has, as usual, made periodical examinations of samples taken from the mains of each company, and that he has added bacteriological cultivations to the ordinary microscopical and analytical tests. *The results are much less favourable than in most previous years.* The dense smoke-bearing fogs of the early part of 1891, and the floods produced by the considerable rainfall in the summer and autumn had an exceedingly bad effect on the condition of the river supplies, and Professor Frankland states that *water of such bad quality, as regards organic matter in solution, has rarely been delivered.* It is satisfactory to learn that no abnormal amount of sewage contamination was detected, most of the organic matter being evidently derived from vegetable sources. Nevertheless, the water was at times *repulsive to both eye and palate*, in consequence of the amount of matter in suspension which it contained.

The water from the Lea, on which the New River and the East London Companies mainly depend, appears to be much less highly charged with impurities than that of the Thames, to which all the other companies (except the Kent) resort for

* London: Printed for Her Majesty's Stationery Office, and sold by Eyre & Spottiswoode.



their supplies. Taking the mean proportion of organic impurity contained in the Thames water delivered in 1853 as 1,000, that proportion had not been exceeded since 1882, and in 1883 and 1890 it fell to 677 and 680 respectively, but last year it rose to 1,002. The same standard applied to the Lea water gives 432 for 1890, and 684 for 1891. But though, as already stated, the turbidity of the floods is to a very slight extent represented in the water as delivered by the Companies, there seems no reason to doubt that the filtration which the water undergoes has a very considerable purifying effect. Conclusive proof of this is found in the results of the bacteriological examinations which Professor Frankland regards as 'a quantitative and exceedingly delicate test for the efficiency of the filtration, natural or artificial, to which the water has been subjected,' and he regards it as proving in the case of the river waters delivered in London, 'how very efficient, as a rule, is the sand filtration as carried out by the Companies for the removal of microbes and their germs.' He states that in March, 1891, the Thames water, at the intakes of the Water Companies, developed by cultivation no less than 33,233 colonies of microbes per cubic centimetre, whilst the West Middlesex Company at the same time was delivering water which developed only 56 colonies from the same volume; the filtration having thus removed no less than 99.83 per cent. of the germs in the original water. In referring to this test, Professor Frankland takes occasion to point out that the vast majority of microbes found in potable waters are, so far as is known, entirely harmless, and pathogenic bacteria have been discovered among them only on rare occasions, and never in any water supplied to London. It is, however, of course possible that some such bacteria may escape observation, and it must be remembered that special kinds of harmful organisms can be cultivated only in the bodies of animals, and are therefore undiscoverable by the process employed."

The appendices relating to this subject may be very usefully read now in conjunction with the proceedings before the Royal Commission. It is satisfactory to find that the constant-supply system is being steadily extended by most of the London water companies; it now, it appears, has been applied to no fewer than 504,163 houses, or about 65 per cent. of the whole number of houses supplied by the companies.

The fourth, and last, section of the report deals with Local Taxation and Valuation. We learn from it that the aggregate amount of the public rates levied in England and Wales rose from 19,198,579*l.* in 1874-75 to 27,713,409*l.*

in 1899-90, being an increase of 8,514,830*l.* or 44.4 per cent.; that during the same period the total receipts of the local authorities increased by 14,552,073*l.*, or 34.1 per cent.; and that their receipts from loans fluctuated considerably in different years, the smallest amounts in any years in the table being the 7,000,383*l.* received in 1888-89, and the 7,050,143*l.* received in 1889-90, and the largest the 15,351,914*l.* received in 1881-82.

GILLING CASTLE, YORKSHIRE.

GILLING is situated about eighteen miles on the main road from York to Helmsley.

Independently of the picturesque surroundings, the place itself derives much interest from its immediate vicinity to the fine old castle and the venerable church at a little distance away in the valley below.

The manor of Gilling previous to the Norman Conquest was in the possession of Barch (a Saxon Earl), and after the Battle of Hastings William the Conqueror granted it to Hugh, son of Baldric, a Norman knight. It shortly afterwards was transferred to Baron Roger de Mowbray, from whom it descended, through successive owners, to the hands of the Fairfaxes.

The castle itself, which remains little mutilated or injured by time, stands on an eminence partly surrounded by luxuriant foliage, above which appear its ivy-mantled towers. Originally the castle had a moat, traces of which may still be seen. The most ancient part is the eastern end, shown on the accompanying sketch. An entrance was formerly on this side, but is now walled up; the arch stones have shields with the armorial bearings of the DEitons, the original founders.—*temp.* Henry II., 1154. This entrance communicated with the lower parts or dungeons of the Norman Castle, now used as cellars.

The sketch shows the keep (69 ft. high) with two projections, one containing a staircase, and the other being the oriel window of the large dining-room.

The outer walls vary from 8 ft. to 15 ft. in thickness. The great Dining or Elizabethan Room is a fine specimen of the style, and is the principal feature inside the Castle. It is 39 ft. 6 in. by 22 ft. 3 in. wide, and is 17 ft. 3 in. to the ceiling. It is lighted by the large oriel, which is 14 ft. 6 in. by 10 ft. within the

millions, and two large mullioned windows in the south and east walls, all containing stained glass with the armorial bearings of the Stapyltons, Fairfaxes, Constables; that on the south side bears the date and name of the artist, "Bernard Dininckhoff fecit, 1585." The oak wainscoting, which covers the walls up to 12 ft. high, has very fine mouldings, and the panels, seventy-two in number, are inlaid with flowers and other patterns, said to have been designed and executed by ladies of the family. Between the panelling and the plaster frieze is painted a series of genealogical trees, with the armorial bearings of the gentry of the county entitled to bear arms at that time.

The floor is of black polished oak. The ceiling, with its delicately-moulded ribs, pendants, and frieze, is a very good specimen, and in good preservation.

The west side of the Castle, which is now the entrance front, was erected from designs by Sir John Vanbrugh, as also the two projecting wings.

The church, which is not far distant, contains many interesting features and monuments.

E. R. TATE.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A GENERAL business meeting of this Institute was held on Monday evening last, the President, Mr. J. Macvicar Anderson, in the chair.

The Intermediate Examination.

The President announced that an Intermediate Examination to qualify for registration as Student of the Royal Institute of British Architects was held on Tuesday, Wednesday, and Thursday of last week. Thirty probationers applied to be admitted to it, and the applications of twenty-four (five of whom had been relegated to their studies on previous occasions) were approved. Of those twenty-four probationers, thirteen had passed, and were now registered as Students; eight others were relegated to their studies in all subjects of the Intermediate Examination, and the remaining three in certain subjects. The thirteen passed candidates, placed by the Board of Examiners, in order of merit, were Messrs. H. C. Lander, A. E. Corbett, J. Kirkland, jun., H. Bulman, G. W. Fraser, G. C. Lawrence, A. K.

Hennell,* I. Taylor,* H. E. Church, H. Bailey, F. B. Donkerley, R. C. James, and E. Nicholson. The first registration of students of the Institute, under its Charter of 1887, took place just two years ago, and the number of students was now fifty-four. The "testimonies of study" submitted were in some instances so excellent that the Council had decided to exhibit a selection of them in January, when the annual exhibition of prize drawings will take place.

Election of New Members.

The following gentlemen were balloted for and duly elected, viz.,

As Fellows: Messrs. H. White, Penzance; H. F. Tomalin (Associate), Public Works Department, Colombo, Ceylon; P. Ozden (Associate), Manchester; C. S. Smith (Associate), Reading; J. E. Trollope (Associate), London; S. J. Newman, Northampton; A. W. Brewill, Nottingham; R. H. Hill, M.Inst. C.E., London; C. W. Bavis, Southsea; W. Ravenscroft, Reading; W. J. Morley, Bradford and Bolton; S. Selter, jun., Hyde; and G. H. Jeffery, Florence.

As Associates: Messrs. A. C. Houston, London; R. J. Angel, Birkenhead; J. M. Harvey, London; E. H. Jones, Liverpool; M. S. Hack, London; A. W. Jarvis, London; J. Paxton, London; A. W. Cleaver, Leytonstone; G. McL. Ford, London; T. G. Mansell, Birmingham; and B. A. Reid, London.

As Hon. Corr. Member: Mr. Charles Bebbcock, Professor of Architecture, Cornell University, Ithaca, New York State, U.S.A.

Election of Honorary Secretary.

A special general meeting was then held for the purpose of electing a new Honorary Secretary, in the place of Mr. Aston Wehh, resigned.

The President said the meeting would be aware that the Council had nominated Mr. William Emerson to fill the position of Honorary Secretary, and only that name having been put forward he begged to move with great pleasure that Mr. William Emerson be elected Honorary Secretary of the Royal Institute of British Architects.

The motion was agreed to by acclamation.

Mr. Charles Barry, F.S.A., moved a vote of thanks to Mr. Aston Wehh for the way in which he had discharged the onerous duties of the office for some time past. Mr. Aston Wehh had not only brought to the discharge of the duties of his office the abilities which they all know he possessed, but he had given them a very great deal of very valuable time. He was rather glad to think that the increasing demands upon his time, in a different and perhaps more remunerative way, had to some extent caused his retirement, and he congratulated him, as he was sure they would all do, most heartily upon that reason. He felt a sort of paternal pride in Mr. Aston Wehh when he recalled the fact that a considerable part of his early professional life was passed in his (the speaker's) office.

Mr. John Slater, B.A., in seconding the motion, said that no one connected with the Institute who had not had some experience on the Council could have any idea of the amount of time which the conscientious performance of the duties of Honorary Secretary demanded of the person who held that office, and no one could doubt that those duties have been conscientiously performed by Mr. Wehh. But their regret at losing him must be tempered with their gratification, as Mr. Charles Barry had said, that it was mainly his largely increasing practice which necessitated his withdrawal from the office. The office of Honorary Secretary to that Institute had traditions attached to it in the highest degree honourable, and all who had noticed the way in which Mr. Aston Wehh had performed his duties must admit that those traditions had been most fully and honourably sustained. Those who knew him personally would regret the loss which they would sustain, but he ventured to hope that his absence from the council table would, at any rate, be only for a short time.

The President then put the motion, which was unanimously agreed to, with loud applause.

Mr. Aston Wehh, in acknowledgment, said that really the thanks were entirely on the other side, and he had to thank the members for having allowed him to occupy that position for the last three and a-half years. It had been a great pleasure to him, and he should

always look back with satisfaction on the fact that he had been allowed to occupy that post. He could not sit down without saying what a pleasure it had been to him to serve under such distinguished Presidents as Mr. Waterhouse and Mr. Anderson, the present President. The kindness he had always received from them he had received from every one. From the Council he had received nothing but indulgence; from the Secretary and all the officers of the Institute he had received a great deal of help. He had always considered that the Institute was especially fortunate in the officers who served it. He was quite sure that the same kindness and help which had been extended to him would be extended to his successor, Mr. Emerson. When he felt bound to tender his resignation he did so with great regret, owing to personal reasons which it was unnecessary for him to name. But he might say that they had nothing whatever to do with the policy of the Institute or with the Institute itself, but were purely personal. The more he had worked at the Institute the more he had believed in the actual necessity, to practising architects all over Great Britain, of some central body such as the Institute.

Picture-Gallery Decoration.

An ordinary general meeting was then held, when

Mr. J. D. Crace read a paper on "Picture Gallery Decoration." He said that while on a recent visit to Brussels and Antwerp he saw for the first time the new picture galleries in those cities. Both were important collections, especially rich in the earlier works of the Flemish school. His object, however, was not to speak of the pictures, but of the means adopted for exhibiting them. The modern Belgian school had occupied so prominent a place in the art history of the last thirty years that every artist might fairly expect to learn something from any important effort in which the Belgian painters might be assumed to be deeply interested. He was therefore anxious to see what lessons could be learnt from the decorative treatment of the new galleries themselves. He found, in the first place, that the two Musées in question entirely differed from each other in the main theory of colouring; and, even after making considerable allowance for the superiority of the Antwerp collection, it was not difficult to see that the Brussels pictures suffered grievously in comparison, owing to the mistaken theory adopted in the colouring of the Brussels galleries. That theory was that pictures gained in tone by being placed on a dirty or very low-toned background. That was a common mistake, founded on a crude and unobscuring reduction of the laws of contrast. There was no more harmony to be got out of crude contrast of tone than out of crude contrasts of colour. And where the human eye, or his representation,—was concerned, "sympathetic" harmony was indispensable. A picture did not appear the fresher for hanging on a dirt-coloured wall. In both cases the flesh tints, with their delicate gradations of shade, were dragged down, not helped up, by the greater mass of degraded colour. The Brussels pictures hung on what could best be described as a "mud colour," with the result that at least nine-tenths of them suffered in tone. The picture galleries, or rooms, on the first floor of the Brussels Musées were built around, and with one side open to, a large, oblong, central hall, open from ground to roof. That hall was lighted from above, the roof being carried on an arcade with white or light-grey marble columns. The enriched soffits of the beam were lavishly gilt, but the gilding ended there, except in a feeble spray of ornament in the spandrels of the arcade. That was unsatisfactory, because the gilding separated the roof structure from the rest of the building. It should either have been carried further or omitted at any rate in such quantity. There was much that was noble about the building, but its colour treatment appeared to the author to be very unfortunate both for building and pictures. The Antwerp Musées presented entirely different conditions. One had no sooner fairly entered the building than he found himself in a grand vestibule, containing the double staircase leading to the picture-galleries. The whole of the upper walls of the vestibule were devoted to pictorial decoration on a grand scale, the panels being filled with groups of figures, considerably above life-size, illustrating the history and development of the art of the Antwerp school.

Those fine paintings, by De Keyser, were executed in a full and somewhat brilliant key of colour. The margins which separated them, and the mass of the cornice above them, were coloured a rather dark grey-green, with very little relief. The same tone was carried up into the cove above, but relieved, somewhat sparsely, by a russet red. The effect, though not without some dignity, was to establish too much separation between the pictorial surface and its architectural setting. The dull greenish black somewhat forced the colouring of the pictorial groups, of which colouring there was too little suggestion of recall in the decoration of the architecture. A few lines of colour, approaching in tone some of the leading colours in the groups, would have greatly helped to weld the paintings and architecture into a more complete whole. Within the picture galleries themselves the colouring was far more favourable to the pictures than that of the Brussels Musée, and many of the pictures showed admirably. The walls were tinted dull red, of a tone somewhat too pinky and cold to be quite satisfactory, yet by no means unfavourable to the majority of the pictures. The cornices were tinted with the same dark tone of greenish-grey which was used in the grand staircase, a shade of the same prevailing in the cove above, where, again, the very low-toned red was used in relief. In that position one had a good result to the pictures occurred from that mode of decoration; but it had a depressing and rather mournful effect on the rooms themselves. No harm to the pictures would have been wrought by accepting a somewhat less dismal scale of colour above. It was noticeable that both at Antwerp and at Brussels all light tone was omitted from the upper features of the galleries in which the pictures hung. Yet some use of a tone of white (more strictly a stone tint) a little lower in tone than the whites in the paintings would have found actually helpful to the light tones in the pictures, always provided that it were not so lowered as to lose its character and look dirty. Before concluding his paper, Mr. Crace read a letter from Mr. Alma Tadema, R.A., who, after expressing regret at his inability to be present, said that he, for one, believed that as pictures were harmonies composed of colours, any colour on the walls must be injurious to them (the pictures), as it necessarily interfered with some of the colours which formed part of their harmonies. He, therefore, believed in only three backgrounds to see pictures upon, viz.: white, black, or metal. White, however, would interfere with the brightness of a picture; black would injure the power of the painting; there remained metal, the very thing the artists chose to isolate their work by introducing it into their frames. That was the reason why he always advised the use of the stamped Japanese paper without colours for the lining of the walls of a picture gallery, and he had always found it satisfactory where it had been applied. Mr. Crace, commenting on Mr. Alma Tadema's letter, said that that gentleman actually suggested three colours, of which two were the most powerful extremes of the whole scale, black and white. Black undoubtedly would knock all the colour out of any picture, and white, on the other hand, would dirty any picture which was not exceedingly fresh; but then there remained the metal. The drawback to that, taken as a ground for a collection of pictures, appeared to be not only that it did not do justice to the pictures, but that it in some degree clashed with the frames, for the frames could not be left out of account altogether. As to pictures always looking well on Japanese gold paper, he advised Mr. Tadema to look into the Arts and Crafts Club and see how injurious to pictures, or to some pictures at any rate, a paper of that kind could be.

Mr. W. White, F.S.A., in proposing a vote of thanks to Mr. Crace for his paper, said it had always been his impression that it was an accepted axiom that a background for pictures ought to be of neutral tint. He could not help thinking that a neutral tint would be the best for them under almost all circumstances, because it would neither affect the contrast of the various colourings of the pictures themselves, nor, or unpleasantly subdue harmonies. But he thought that the suggestion to some small pattern upon the background was of very great value indeed. Even with a neutral tint, that neutral tint probably would not be such as to

* These two gentlemen bracketted equal in merit. See *Builder*, p. 373, ante.

suit all the pictures, and it was very likely to be such as not to be in itself quite a pleasant one, for it was very difficult to get very satisfactory neutral tints. A neutral tint, broken with some slight pattern such as Mr. Crace had spoken of, with rather more positive colour,—of a tertiary colour, he should think,—would give that subdued tone which would admirably set off the pictures.

Mr. H. L. Morance said he had recently seen one of the galleries to which Mr. Crace had alluded, viz., the one in Brussels, and he fully agreed with Mr. Crace that the effect of the Brussels gallery was very depressing, and at the same time very ineffective. There was a certain amount of monotony in the rooms themselves, and he had never walked through rooms in which he got tired so soon. He did not think that a suite of rooms opening into a central hall was effective for the display of pictures. Nor was the light properly diffused for general effect. A draper background was necessary for pictures. He had noticed in galleries and private houses that no background was so well suited to show oil-paintings as a not too vivid red. At the same time almost every room required separate treatment: what was suited for a top-lighted apartment would not suit one with side lights or one which was lighted from the end. In such cases more decided colours might be used. He knew of a room in London which had walls a bright turquoise blue, which made an admirable background for the pictures which were upon it. He had much pleasure in seconding the vote of thanks to Mr. Crace.

Mr. Sydney Vacher, in supporting the vote of thanks to Mr. Crace, said that one element must not be left out of consideration in dealing with this question. He referred to the gold frames of the pictures, for the use of gold frames would allow almost any amount of colour on the walls. It seemed to him that Mr. Crace was wrong in saying that black would kill any picture, for he recollected certain rooms at Pompeii, as well as some rooms in Sir Wilfrid Lawson's house in London, in which the ground was black; at the same time he thought that it would be found that where a black ground-work was not injurious to colour or to pictures, it had a varnished or glossy surface. He thought he had heard some one make use of the word "tint;" it seemed to him that that was one of the evils of decoration; we got too much tint, and not enough colour. It seemed to him that in England we wanted bright colour.

Mr. R. Herbert Carpenter said he should like to instance a case in which the decoration of a room was left entirely in the hands of the artist who painted the pictures. He alluded to Wortley Hall. The room was built to receive four great pictures which Mr. Poynter painted, one of them representing Atalanta's race. Lord Wharmliffe left the decoration of the room entirely to Mr. Poynter, and the decorative works were carried out by Sheffieldmen under his direction. The whole scheme of the decoration was brilliant. There were two principal colours, a brilliant blue and a green for the ground; in one place, under the soffits, a dull red was employed. The whole thing was an example of brilliant colour. It was lighted by flats of glass, which were treated in the same general scheme of colouring, introducing white. The whole effect was to give a surface of mother-of-pearl-like appearance. The whole was an example of brilliancy of colour, and in Mr. Poynter's opinion was not unsuitable for his pictures.

Mr. J. M. Brydon, Mr. R. Pheasant Spiers, and Colonel Prendergast having made some observations, the vote of thanks to Mr. Crace was cordially agreed to, and that gentleman having briefly replied, the meeting terminated.

PLUMBERS' EXAMINATIONS.—The London Board of Examiners in connexion with the National Legislation, London, met the other day at the Guildhall, London, Mr. Chas. Hudson, Chairman of the Board of Examiners, presiding. The meeting was attended by the representatives of the several London Lodges of Operative Plumbers. Various matters with reference to the examination questions and practical tests for candidates for registration were discussed, and the regulations with reference to the regulations for examinations were revised. Additional were approved, the object being to facilitate those examinations. At the conclusion of the business the examiners dined with the wardens of the company, the Warden (Mr. W. H. Bishop) presiding.

SOME MYSTERIES OF MODERN ARCHITECTURE.*

I AM well aware that, by virtue of an unwritten, but seldom broken, law, it is generally reserved for the Presidents of our architectural societies to treat in their addresses of the wider philosophies of our art, while the readers of the sessional papers confine themselves to the discussion of its special or detailed technical aspects. May I at once ask your pardon for a transgression of this rule? My excuse for this course is that we have, I think, come to a time in the history of the world's architecture, when it specially behoves us to take occasional, but very searching, glances over our entire position, and withdrawing ourselves from our routine of labour, to take a bird's-eye view of our own manoeuvres.

I know that the world is often divided into talkers and workers, and that those who dabble in the philosophy of any department of life, run a chance of getting themselves classed with ignominy in the former category. It may also be urged, though perhaps untruthfully, that the greatest art-producers of the greatest ages have been men whose soul of art issued in earnest, unconscious labour, and would never have allowed them the bumptious satisfaction of theorising about the objects of art or their own place in the universe. Now I think we may have a mistaken fear of wholesome speculation about the great and main issues of our art. When we have an eight hours' legislation for architects we shall be obliged to exercise some of our enforced leisure in contemplation; in the meantime let us forestall that age of bliss by looking up from our drawing-boards and our drain-inspections for a few minutes of pertinent reflection. It is no discredit to a workman of whatever grade to make use of his brains. An architect, as his name implies, is the king of workmen, and while his myrmidons are engaged in Socialistic efforts to destroy the House of Lords or to get a gasfitter into the Cabinet, he may with equal justice exercise his powers of thought on a matter which at least concerns him as much as the subversion of our Constitution.

It is hardly true that art-thinkers and art-workers are or have been always distinct personages. A host of examples can be brought to disprove it. The work which crowds in upon any distinguished architect of these latter days leaves him little leisure for committing his views to paper, but it does not follow from this that he is the less of a thinker. It is almost the duty of us younger men, before we are entangled in that vortex of overwhelming engagements (which is the object of our daily hopes) to school ourselves into something of a habit of looking, not merely at the minutiae, but at the whole of our art, and not even to stop there, but to consider its relation to other arts and its place in the world.

Do not be alarmed, I am not about to cover this vast field in an evening, but I wish (with this much of excuse, or justification) to encourage some thought, and I hope discussion, on two or three of the points which first occur to the architect who starts a-thinking.

What is architecture? This is not a conundrum; if it were there would probably be an answer to it, but there is not,—at least, there are several answers, which, for logical purposes, comes to the same thing as leaving the question unsolved. We have taken a negative way of answering the question which is the best reply that can be given under the circumstances. An architect principles of construction or of the elements of the history of great buildings in the past, or of the requirements of wholesome building of comprehending; he is not a man incapable of comprehending; he is not a man incapable of comprehending; he is not a man incapable of comprehending. Here, as far as I understand, is the *raison d'être* of such tests as architectural examinations. A great many of the enemies of the examinations, and possibly some of their warmest but not wisest friends, consider that they are regarded as conferring, when successfully passed, a diploma of qualification, a view which I am told is sometimes cherished by gentlemen who have just passed the ordeal.

Surely there is a great mistake here which a little thinking would dispel. The examinations are not a golden key, but a sieve. Squeeze

* A PAPER by Mr. Paul Waterhouse, M.A., A.R.L.B.A., read before the Architectural Association on the 18th inst., as elsewhere reported.

through, and you show that you are not of such a clay as to be absolutely unfit for the function in life to which you aspire. But to say that all who successfully pass these examinations are thereby duly certified as complete and efficient architects, is, I believe, under any system of examination, impossible.

I have no wish to touch on our late unhappy divisions, but I must allude to their obvious and most useful result. On the avails of strife there has been hammered out a red-hot truth (which, as far as I know, nobody ever wanted to deny) that there is something that goes to make a man an architect which is so spiritual and so evanescent a thing, that it can't be caught and bottled, it can't be labelled, and it can't be stuffed into a curriculum or stipulated for in articles of pupillage; in fact, architecture is not a corpse, but a body with a soul. The body by itself cannot claim to exist, though but all that it is a necessary condition, and must be perfect in every part. A disembodied spirit, in this sense, is of no practical use. You may say that architects, like poets, are horn, not made, but, after all, it is only part of a poet of which it can be said that it is not made, but born, for you will notice that it is of some practical necessity even to a poet to be taught a language and the use of A, B, C. Our professional disagreements have practically amounted to a tug-of-war between materialists and spiritualists; both sides have fought for a half-truth with a persistence which forces the onlooker to the conviction that the real essence is a compound of the two errors,—it forces him, in fact, to the conclusion that the baser parts of architecture (if you choose so to call them), I mean the intellectual stock-in-trade, the knowledge of the past, and what is known as experience, are the essential counter-part in a complete architect of that diviner something which cannot be defined either as "taste" or "creative faculty."

Gentlemen, I do not merely refer to the hackneyed (and I hope extinct) controversy of the question, Is architecture an art or a profession? a controversy of which the acrimony and the length were fostered by the fact that there is the greatest liberty in the definition of the terms art and profession, and that if either of them can be logically defined (which I seriously doubt), architecture would be found to be both. I say, I do not merely refer to the terms of that controversy when I draw your attention to the useful analogy of a tenet in ancient Greek philosophy. It was held in that analysis of human nature that man is a compound of the beast and the god. Were he purely divine or purely animal he would cease to be man. Now how does this analogy apply? On the one side of architecture we see what are generally called the fine arts, a family of human exercises among which architecture herself is generally (sometimes only nominally) allowed a place, and on the other side we see, not commerce (for this lies for the present out of the category), but another family of human industries, these namely whose function it is to supply the apparatus of life and comfort. By the fine arts (exclusive, for the moment, of architecture) we imply a manifestation in different directions of a certain creative and combinative power in man, the primary object of which is rather to appeal through the senses and intellect to the spirit, that to minister to any of man's bodily wants as a being. On the other hand by the ministrative industries to which I have alluded, we mean all these occupations which result in the supply, not of food, nor, perhaps, of clothing, but of the more permanent instruments of comfortable existence, such as buildings and furniture. It is the glorious position of architecture not to fall between these categories, but to unite them. It is the glory, not the shame, of man that he combines in his nature the difficulties of animal nature with the possibilities of a god, and so, if architecture is in academies or elsewhere a despised sister among the arts, let us remember that her position is a different one,—let us, in fact, recall the history of Cinderella, who, if you remember, was not thought much of in the family circle, but was given an opportunity of showing that the difference between herself and her sisters was a considerable one—in her own favour.

These matters I know are very obvious when looked at plainly, but they are for this very reason easily overlooked, and when we talk of our art as an art we may easily pass over the circumstance

that the mere fact of its being an art is almost the only link that binds it to two at least of the others. Like Cindrella, again; she was a sister, but how little like. If we take painting, sculpture, music, and poetry as representing the sister arts, we shall quickly see to what a strange degree this is the case. Painting and sculpture (of course, I do not here include purely decorative painting or merely architectural sculpture) have as a common ground the fact that these results are accompanied by, and more or less dependent on, representation, or, as the ancients called it, imitation. Poetry, too, touches them on this point, for its processes also involve representation in the sense that by means of words it conveys interpretations or descriptions of nature's facts. Further, poetry possesses rhythm and repetition as means to its ends, and in this shows a family resemblance to music. Music, to proceed, has an important element in proportion, which, though it is recognised by the arts above-mentioned as something of a law, is not employed by them in so precise and arithmetical a degree.

So when we come to the more difficult matter of taking architecture to pieces to see of what it is made, we shall find that with painting and sculpture, the arts to which it is most usually allied, it has the fewest points in common. True, it deals as they do with colour and with form, but representation, in their sense is no part of architecture. Its community with music and poetry is established by the mutual elements of rhythm and repetition, and indeed our art comes more close to music than to any other of the arts, for besides their similarity in repetition and rhythm, they have in common the important element of proportion. I need only remind my bearers of a certain chapter in Alberti's treatise on building to show them to what lengths, perhaps fantastic lengths, this community, nay, almost identity, may be strained. I have gone through this analysis of the arts merely to arrive at this conclusion, that in spite of these few points of contact, architecture still stands utterly aloof from the group, and for this reason: If any of the other arts begin but for a moment to serve any but a moral, intellectual, or æsthetic purpose they are done for.

If painting relapses into a mere record of facts, or pleases simply from its imitative power, it is lost, and so with sculpture.

Music cannot be turned to purely utilitarian ends, but it can become meretricious, and poetry, too, by appealing rather to man's physical than to his inner aspirations, misses its aim.

But with architecture the case is otherwise. I do not mean that it is incapable of degradation. Heaven forbid! But I do mean that it is one of the first duties of architecture to minister directly to the physical requirements of man. It has an element in common with all other arts, namely, as I have said, the undefinable but well-understood element that it is an art; but its first, or shall I say its normal, function is the application of this element to the otherwise purely utilitarian process of providing man with a dwelling.

It is sometimes said that there are two kinds of buildings: those that have architects and those that have not, and it has been contended even by a well-known authority, who ought to have known better, that an architectural building differs from a non-architectural in being, among other things, more costly. Such a statement is based upon a theory that the architect's function is to induce a man who only wishes to have his wants supplied to go out of his way to over-elaborate the means to his end. Here is an error which ought never to overcome either an architect or a member of the outside public. Once and for all it should be understood, not merely as a matter of architectural policy, but, as a matter of fact, that every building requires, and for that matter has, an architect. The architect may be consigned to oblivion under the guise of a salaried (perhaps a low-salaried) clerk in a speculative builder's office, or he may be reft of his credit by a usurping client, who says: "I designed my own house, you know; just got a draughtsman fellow to put things together, but I settled it all myself." But, for all that, some one brain must have conceived and contrived the building, or as a building it will have suffered, if only through the waste of material. Let us, then, grant that every building, however small, and, particularly, however cheap, has an architect, and we shall find that buildings have all the

same to be divided into two broad classes, or rather into three.

In the first class are the buildings best described as monumental. In the next are the domestic (I use the term widely), and in the third the utilitarian,—a class for which I would if I could most gladly find a prettier and a better name. I once heard of a man of humble origin, who, beginning life as a journeyman painter, developed some skill in art and became a creditable specialist in landscape, succeeding eventually in getting some of his works exhibited in or near Piccadilly. His elevation to the ranks of high art did not prevent his retaining a wide view of the scope of painting,—a painter he said to himself is nothing more or less than a painter, and what do you think he did? Why, when landscape business was slack, he wasn't above doing his best at horse-work, he went back to the "knotting, stopping, and four oil department," only to blossom again with renewed vigour in his gilt frames on the line.

I am aware that the painter has not often the opportunity of thus extending his sphere of art,—that, in fact, a good many of the gentlemen with north lights and studios would make a poor show when they substituted trades and scaffolds for easels and mahlsticks,—and, indeed, that the works of house-painters are not often hung in west-end galleries. I mentioned this versatile gentleman by way of illustration, to show, indeed, that the architect's range is not less wide than his, and in this way: my third class of buildings are these which have primarily to fulfil a certain useful end at the least possible outlay. It is in such buildings that the "fitting" is synonymous with the "beautiful," and in them there is as legitimate an opportunity for an architect as in the design of a triumphal arch. It is a fact, and I think not an indecent fact, that there are even dust-hins and pig-styes in this country designed by members of the Royal Academy. It may not be that it is as designers of pig-styes that they write "R.A." after their names, but I doubt if they ever feel that these designs were beneath their lawful attention: and I firmly believe the pigs are the better for having such distinguished architects, whose skill was devoted not to the undue embellishment of these dwellings, but to the comfort of the inmates, and to the economical disposal of the proprietor's land and materials. This matter is not merely a joke; the R.A. and the pig-stye represent, it is true, the meeting of extremes, but it is often the lot of an architect to deal with buildings of what may be called the pig-stye class, and in such cases it is no business of his to say "this job is not architect's work; it cannot be treated architecturally." I say it can be, and the architectural treatment in such a case is to make the building exactly the right size, exactly the right shape, not ugly, possibly picturesque, but never ornate. So much for the lowest of the three classes in the scale of architectural buildings. The highest class,—the monumental,—contains buildings of public importance of all kinds. In these it is of prime importance that the details of the architecture should conform to a recognised style; and for this reason, it is generally allowed, even by those who most desire to diminish the poor architect's sphere of action, that they should be produced by architects,—that is, by men who have made a professional study of style. In the intermediate class, which I call the domestic rather for convenience than because I consider that the word exactly covers all buildings of the type I refer to, a greater liberty is allowed in the matter of design, and, alas! still more liberty is often taken. It is in this class of work that the public most readily adopt the error that an architect's building means a building in the construction of which they pay a professional gentleman to make it more expensive than it need be. Are they ever in the right? I don't know: but, at all events, an architect in this aspect ought to be one who continues the artistic and economic arrangement of his client's wants. The client states his requirements, the architect solves his problem, or may be (and this is sometimes the case) he has also to enlighten his client as to what it is he really wants, or what he ought to want.

I am aware that I have omitted one class of buildings from my three-fold category, and I have done so because such works are rarities and fall outside the general run of practice, though, none the less, they represent the archi-

tect's greatest difficulty and greatest opportunity. The works I allude to are those constructed for some man of wealth, whose object is to invest capital in artistic production. He does not want waste, but he knows that art and precious materials cost money, and he says to his architect: "Make me a rich building of costly materials, and of the very best and most profuse and artistic workmanship." He says, in fact: "Here is an opportunity for you. I won't restrict you by conditions or by a limit of expenditure, but I want you to do, and get others to do, the very best that can be done."

We most of us long for opportunities of this kind, but until they come I doubt if any of us realise the hesseness of the restrictions under which we usually work. Restrictions are not the curse, they are the blessing of architecture, and here is one of my mysteries. If a client removes all restrictions, what is to be done? Why, it is left to the architect to make his own, and then we shall see what stuff he is made of. Where will he admit, and where will he omit enrichment? Where will he extend, and where compress his accommodation? Where will he use his costly materials? Where will he decide that they are out of place? Where will his elevations be exuberant? Where will he keep them quiet? Nothing can guide him but his artistic sense; and if this be absent, he will succeed, no doubt, in assisting his client to break a record for outlay; but will he, by virtue of his opportunity, have been able to put himself ahead of his brothers in art who are not blessed with such liberal patrons? It is a melancholy fact that few among us would show our best talents in a case of "carte blanche." If we have had such opportunities, and have been none the worse for them, we may take pride in a consciousness that we have something of the right material in us. It was said by somebody, but I cannot verify the quotation, that art consists of the application of the finite to the infinite,—chaos alone, quantity alone, costliness alone is not art. You want in art, and especially in architecture, the element of order,—that is, of restraint, or, using the word in a large sense, of "economy." There is not art in a marble mason's stoneyard, nor in a decorator's show-room. To produce art you must choose, you must eliminate, you must fix your boundaries.

Let me pass to another point. Have you ever reflected on the isolation of our position? Of course, there are scores of trades, professions, and arts, the methods and technique of which are concealed from the uninitiated, even when the secrets of these crafts are matters of real importance to the public. How ignorant, for instance, are people generally of those primary facts of physiology, the very elements of their bodily existence, which are the groundwork of a physician's education; how little we know of the ins-and-outs of the tailors', hootmakers', and even of the cooks' arts, though their products are matters of daily moment. Various causes contribute to our apathy on these matters; but principally the fact that in most cases it is not worth our while to get to the bottom of processes which we can get well leave to others. In the matter of architecture the case is different. The general public are not supposed to know, nor need they know, all or anything about the processes of building, nor the nature of materials, but all people who go about our towns and our counties with eyes open (and especially all educated people), have a notion that they are more or less judges of the architectural merits of the buildings with which they meet. A building, they argue, carries its recommendation on its face, and it is for them to judge, as in the case of human countenances, whether the face is a handsome one or the reverse. In a general kind of way we architects are apt to agree with this idea; and may be inclined to say off-hand that truth in the general body of the most celebrated, if not the best architects are those whose works are most approved by the general public. Now I think we ought to ask ourselves, and it is really rather a serious question, whether there is, in fact, any truth in this idea at all? I notice, by a rather odd coincidence, that Sir John Millais has lately submitted to an interview on the subject of art and public opinion, in which he is reported to have said: "The general flood of public opinion is always right, don't you make any mistake about that. It is as true as you are sitting there" (I quote from the account of

the interview). "It is as true as you are sitting there; it's the one thing I know is certain." Now, Sir John may have the best possible personal inducement (in fact, we know he has) for believing the *vox populi* to be infallible as a judge of painting, but isn't he mistaken even in the matter of pictures? and isn't it certain that in the matter of architecture the case is wholly otherwise? There is such a thing sometimes as public taste in architecture. There is often an expression of public opinion on the merits of various buildings or classes of buildings, but what does it amount to, and what is it worth? Most of us, I am happy to think, could mention a few names of friends of our own outside the profession whose opinion we really value in questions of architectural taste; in some it is a result of study, in others a kind of innate and illogical faculty rather resembling that species of intuition which is known in another sphere as "an eye for a horse," a power of discrimination which its very owner would heat at a loss to explain. I say most of us know a few friends in the outer world whose opinions would have real weight with us in these matters; but what are we to say of the general body, not of the public of course, but of enlightened and well-educated men and women,—what is their judgment worth on architectural matters? Perhaps the best we can say is that we treat it rather with respect than with deference. I believe that many a man who has spent his life in the general criticism of the arts, from an enlightened but non-professional point of view, would on candid reflection own to you that his power of properly appreciating architecture came to him later in life than his other faculties of criticism; that, in fact, he found this faculty required for its development a much greater active study and a much longer unconscious or semi-conscious exercise.

Is it then a fact that in our present age and our own country public opinion is further from the power of appreciating architecture than it has been in past eras and in other lands? At the present moment, I think perhaps it is so, but if we spread our investigation over an extended area of time, we might say "no."

During the last fifteen years we have been, in this country, so free from the fetters of uniform style, that a well-equipped critic must needs have been familiar with the principles of architecture as a whole, before he could possess data sufficient for an analysis of whatever modern production might be brought before him. But in the days of the Gothic revival, and in the earlier but still modern days of the severer classicism, there were many amateur inquirers, who, following the artistic tide of the day, so far immersed themselves in the study of the phase of architecture in vogue as to place themselves abreast of many of the professional architects, and, indeed, to help in forming, rather than following, the architectural cult of the moment. So that, greatly as we feel this isolation nowadays, I doubt if we are more alone in the world than the architects of the past. The fact is, that as the proverb puts it, "Art is the concealment of art," and that the finest and noblest products of our own art only reveal to the initiated these mysterious but simple elements from which they are composed and into which they may be analysed. And this has surely been the case in all ages. So that, if we take into consideration the fact that the present century has seen periods in this country when the cultivated energies of the upper classes followed, or even at times led, our architects among the details and principles of their art, I think we must acknowledge that in England of the nineteenth century there has been as much concord between public opinion and architecture as can be pointed to in the great periods of the past. The test would lie in an examination of two of the greatest of these periods: the golden age of Greece and the fifteenth and sixteenth centuries in Italy. [I except the England and France, for the reason that we may inquire as much as we like about public opinion in these days without getting much in the way of answer.] "Well, as to Greece," someone will say, "of course, the architecture of that wonderful country was just a spontaneous outgrowth of the life of the people, an embodiment of the combined freedom and reserve which were the characteristics of the Hellenic mind."

Now it is all very well to talk and write in that way, particularly if we really mean any-

thing by it, but do you believe that the general mass of Greek citizens knew everything about the elements of Greek architecture, or even nearly everything? It is my belief that an advanced member of the A.A. Classes could, with a fortnight's special study at the books in the next room, get to know more about the proportional principles of the construction of the Parthenon than was known of the same subject by Pericles. I know this is dangerous ground to hazard a conjecture upon, because the Greeks, as is well known, made so great a speciality of the study of numbers and of their relations. But my reason for the conjecture is just this, that in the many works that remain to us of the general and philosophical literature of Greece, there are, as far as I am informed, nothing more than general allusions to architecture, and hardly any references to these principles which underlie its successful development in the country. Take Plato and Aristotle, writers who made it their very business to analyse the arts and their functions; what have they to say of architecture except in the most vague and general way? Bring me the writings of the great thinkers of Greece, and show me some evidence that they knew more of architecture than the difference between Doric and Ionic. Then and not till then shall we be freed to entertain a belief that the very considerable intricacies of the seemingly simple Greek architecture were the more or less common property not merely of recognised specialists but of the general body of citizens.

As to the period of the Italian Renaissance, we know that that period was the period *par excellence* in which the architectural movement of the day went hand in hand with a great national impetus of a special kind. It is to that country and that epoch that we look, if anywhere, for something more than a superficial appreciation of architecture on the part of the more educated classes. Those who rightly want to understand the true nature of the Italian return to Roman culture in the fifteenth century should study the subject not merely in architectural books, nor, indeed, from the general point of view of art alone, but also in works which deal with the moral, literary, intellectual, and national aspect of the movement in question. We are rather accustomed to think of the Renaissance as an architectural movement, but it was something far wider and far deeper, though the architectural manifestation of the revival is the most obvious, and in some ways the most permanent of its effects.

My inquiry, then, is this: Do we find evidence that enlightened students of that period (other than architects) took a sufficiently deep interest in architecture to form for themselves the basis of true architectural criticism? The question is one for specialists to answer. Alberti might have passed as an instance of a non-professional man with an interest of this kind, but that his interest became so strong as to involve him in the practice of architecture. One feels that there must have been something of the true connoisseur's spirit in Alberti's patrons, in Giovanni Rucellai, and Sigismondo Malatesta, but if so, why did the former allow Alberti to pass off upon him a delicate Renaissance shrine as the express image of the Sepulchre at Jerusalem? and why did the latter vouchsafe no reply to the questions of detail addressed to him by the workmen at Rimini? Those who have a better knowledge than myself of the inner history of those days may be able to point to instances of a closer architectural knowledge on the part of the educated non-professional men. But even any such instances, and even the rare instances in our own country of amateurs who become architects, sometimes to the great disadvantage of the art with which they thus coquet, will not disprove the general truth of the statement that in all ages, even in those where by some coincidence the public taste encourages for a short period the really best class of work, and perhaps especially in the present day, architects have not dared and do not dare to listen for approval or for condemnation to the public voice. Our art is here again like music. What "takes" in a music-hall or on a barrel-organ stands a good chance of being low in the artistic scale, and the building in which an architect adopts all the advice he gets from outside may fall a victim to the best intentions. The parallel is not complete, for we have in this country a musical public,—a public who in their department

know what is what,—but where is our architectural public? Gentlemen, when we sit at our drawing-boards, using alternately india-rubber and pencil over some half-developed idea, to whom is it that in our inmost consciousness we appeal as arbiter? To our own eye in the first place; perhaps (and this is a fallacious, but I believe not unknown, tendency in the case of competition works) to the supposed taste of the assessor, and often to the general body of our professional brethren, present and future; in many happy instances we have thought of our clients' approval, but of the public taste,—never.

But, after all, it will be argued, it is the public who choose architects, and consequently it is the public who decide to whom of our number shall be given the greatest amount of work. They sometimes call in, in cases of competition, a member of our own profession to assist their selection, but even in these cases (which only cover a small proportion of the entire architectural patronage) they reserve the right to fall back on their own opinions as to which of their competitors supplies the best design. This is very true. This is one of the mysteries not of modern architecture only, but of our profession in all times. Our young men, our beginners, have not the same opportunities of starting practice on their own merits that are accorded to novices in other arts. The young painter, and the young sculptor making experiments at their own expense, and with a comparatively small outlay, chiefly of time, place themselves in competition with one another, and by means of exhibitions acquire the notice of the public who are to become their employers. But what can an architect student do to win the confidence which is slow in coming. He can compete for architectural prizes,—that is, for the rewards annually offered for designs on paper; but success in such competitions, even if it necessarily implied (which it does not) the power to bring an actual building to successful completion, is not equivalent to notoriety. A place,—even a place near the ceiling,—on the walls of the Royal Academy, is a better thing for the commercial prospects of the hudding painter than the winning of the Soane Medallion, or even the Academy Medal is to the professional welfare of an architect, though it represents a lower stage in the range of art. He, too, may get hung in the Academy, but the apartment devoted to architecture at Burlington House is, I notice, chiefly occupied by the exhibitors themselves, or (on *soirée* nights) by young men and maidens whose interest is centred rather on one another than on the walls. Architects have to make their beginnings, and even to practise their failures at other people's expense, and thus, unless an untried man wins a competition, or has a little spare cash with which he can build himself a suburban residence as a sample, he has nothing but drawings to show as specimens of his capacity. In other words, a painter or a sculptor gives the public some security, some guarantee. He either sells straight away some actual work which he has painted, so to speak, "on approval," or by such work already executed gives those who are inclined to be his patrons a pledge of his powers. The architect, on the other hand, asks his first client to spend without security. He cannot even say "Don't pay me unless I satisfy you," or if he does say so, this arrangement does not meet the liabilities of the case, for even if he were to forego the amount of his commission, this would not in the event of failure compensate the client for his outlay upon the building which had gone wrong. When you try a new tailor, you run the ordinary risks of a misfit, but the man who gives a young architect his first job is like one who trusts the new tailor to cut him a suit out of cloth of gold worth 300l. or 400l. a yard. Let us be duly grateful to our first clients! This is a great peculiarity of our position, which is often a great hardship; with us the race is not always for the swift; there may have been Sir Christopher Wrens who never got a job,—geniuses there certainly must have been,—and, perhaps, are,—who for lack of opportunity (that is, for lack of friends who will trust their as-yet-untried talents) remain geniuses unknown and unrewarded. Certain it is, too, that opportunity in a hundred smiling forms sometimes waits into notoriety those whose claim is not the claim of art.

The giants of our profession have been, in nearly all cases, men who deserved their position, who had earned it by genius and by hard work, which in our profession has to

be mingled with genius in pretty heavy proportion before an artist is the result. It is a consolation, too, to think that a fair proportion of incapables go to the wall. But most of us are not either giants or hopeless failures. Some of us are mediocrities, and we have to face the fact that the rewards of our profession are not meted out in exact ratio to our worth. We must find our own consolations if we are among those who feel that we have less than our merits desert—and let our consolation not be that of pessimism, but rather the nobler philosophy of a certain parable in which, if you remember, under very unequal conditions, every man received a penny.

And now, gentlemen, allow me to conclude my observations with a few reflections on that most mysterious matter the matter of Progress. That humorous philosopher of architecture, Mr. César Daly, when he was in this country last summer, let fall some remarks on a private occasion which prompted some thought as well as amusement. He mentioned, I remember, that he had asked about a score of his friends to give him, according to their various points of view, a definition of "progress." It appears that they all complied, that they all differed in their conclusions, and that none, according to Mr. Daly's judgment, arrived at the truth, unless, indeed, there were something of the paradoxical truth of humour in the reply of one of them, who said—"Progress? my dear Daly? Why progress is the most execrable thing that ever was known." We all agree that progress means a step onward, but we are pulled up when we ask ourselves or one another, "What is onward?" Mere motion, however rapid, is not progress. Progress is motion forward, onward, and upward. This is the age of progress, and it is for all men to ask themselves which is the upward road in their own sphere of life. The road of progress in any sphere is the road towards the aim, the end of that sphere; and it is we honourers in the field of art who have the hardest task in deciding what is the goal to which we ought to set our faces.

Now I think it is fairly obvious that we architects, in particular, differ very greatly from one another on the very ground that we often take widely different views on this very vital question,—the aim of our art. We may not acknowledge openly, even to ourselves, that we are conscious of a particular end in view, but we are most of us actuated more or less directly by a tendency which may or may not be in the right direction, and those who give least thought to such matters may help themselves into more earnestness of purpose by some reflection on this point.

To some men, clearly, the idea of progress represents origination in the form of novelty. Architecture in their eyes is first and foremost a creative and an inventive art, and they resolve to mark their own frontiers by casting aside the things of the past, and by being original at any cost. Another school, realising the daily advance in our scientific knowledge, and the consequent increase in our acquaintance with the properties of materials, feel that architectural progress is really embodied in all the adaptation to the needs of a building of that the newest opportunities which an ever-broadening science lays at our command. A third group, feeling that architectural beauty is largely a matter of association and tradition, look to a complete knowledge of some phase or phases of extinct art as the true solution of our modern problem. Hence we have side by side at least three bodies of workers, differing not merely in the degrees of capacity, but in the radical divergence of their views on the fundamental aim of their work; there may be three men, all honest workers, all men of talent, all men of moderation,—one will be a pioneer of originality, one a leader in constructional novelty, and the third a stickler for precedent; there may be three others who are failures, but on the same lines of classification,—one an untragic innovator, and the other two, respectively, a hopeless utilitarian and a barren antiquarian. Travellers on each of these roads conceive of their own locomotion as the embodiment of progress, but the onlookers know that it is only in so far as their progress is retarded, that it can be called artistic progress at all. Each has only to accelerate his pace to accelerate his ruin.

Is, then, the mystery of progress in architecture insoluble? I think not; but we had better help ourselves to its consideration by another appeal to metaphor,—to the metaphor of language. Let me explain. There are some occupations which are not directed to one single

achievement, but to the constant achievement of a number of results. Architecture is one of these, and language is another. It is for this very reason that it is difficult to express in a few words the aim or goal of such occupations, and is specially difficult to define the way of progress in them. It is not enough to say that the object of architecture is a certain kind of building, or the object of language a certain class of literary or oratorical or conversational composition in words. In its broadest sense—the object of language is expression in words, and the whole art of language is not to produce one class of composition only, but it is rather an intellectual equipment, fitting its possessor for a variety of productions in various departments. As a rule, the artists of language are specialists, of course. To begin with, they are prose writers or poets; and if poets they may be lyric poets or epic poets, dramatists or song-writers. Still, the art of language covers the whole field of such productions, from the libretto of a comic opera to the delivery of an extempore sermon, and nothing hinders us from saying, spite of all these various manifestations, that language has one definite object,—the expression of thought in words.

Thus it is with architecture,—the comparison of it with language is a very useful one, for it draws our attention to the fact that while, in every individual design, the architect has a particular object in view, the art, as a whole, has a different, a wider, a more general object, the achievement of which is the aim of the art, and the road to which is the road along which progress is marked. The comparison helps us, too, to realise that architecture is a means of expression. In it we have both poetry and prose, the latter represented by our railway stations and workhouses; and the prose, as in literature, may be dignified no less than the verse,—in fact, to be good prose it must be dignified. Alas for the fact that some of our prose architects, instead of rising to the dignity of Ruskin or Sir Thomas Browne, are content with triviality and an absence of style comparable only to the ill-balanced, ill-selected, ill-edited wording of a local newspaper. In poetry we realise that the dignity of the epic or the orthodox drama is sustained not merely by grandeur of language and by strength of sentiment, but also by an adherence to certain regulations of form accepted through long ages as the recognised vehicle of such productions. Is there not a just comparison in architecture? Must not the public or monumental building lean for its effect on traditional forms as well as on solemnity of conception? And is not the impulse which takes a true architect deep into the study of the past, and which makes him, to speak vulgarly, mind his P's and Q's in designing a building of national or municipal importance, precisely parallel to that literary instinct which tells a poet that to attempt an historical drama without having read and digested his Shakespeare, is a mere piece of perilous folly? You can't trifle with an elevation in Whitehall any more than you can trifle with a play in blank verse. In lighter productions the poet has his liberty. The lyric and the love poem are things of fancy in form as well as in sentiment,—and none the less works of art,—and the wise architect is he who knows into which of his works he may throw the sport of an inventive faculty. Alas, that some men (whether understanding this comparison of literature and architecture or no) have driven that comparison too far; who, realising that wit as well as humour have their place in literature, have committed a joke in brick or stone, for this is where the comparison ceases. We have authority for "sermons in stones," but we owe to the man who perpetrates an architectural jest.

The purpose of architecture is expression—genuine expression; generally serious, not always solemn, but never flippant; and thus the aim of architecture is facility of expression in whatever mode the particular case demands; and in so far as this aim is approached progress is obtained.

And what is the secret of this royal road of progress? First, study of past methods; secondly, atonement of present needs; and, lastly, practice.

Lord Bacon said that philosophers were of three kinds, resembling respectively the ant, the spider, and the bee. We know of architects who are typified by these insects. Some, ant-like, are always amassing stores of archaeological lore,

but making no fresh product; others, like the spider, weave from their own imaginations innumerable yards of unprepared novelties; while a third class, in well-ordered hives, store the very essence of a widely-collected learning and yet save their best energies for the production of things of beauty, than which no honey can be sweeter. Gentlemen, let us resemble, if we can, the bees, remembering that we can produce nothing valuable without first storing, and that the largest stores are worth nothing except as a means to our noble end,—which is not reproduction, but production.

You see our own motto is a worthy guide,—"Design with Beauty, Build in Truth,"—but what I have tried to point out this evening is that our motto is of little use to us if we have no means of asking and answering the questions "What is Beauty?" "What is Truth?" Our art has many mysteries,—not fewer to-day than in the days of old,—and these mysteries, if we wish to know Beauty and Truth, are worth something more than an evening's consideration.

Mr. Leonard Stokes said he had great pleasure in proposing a vote of thanks to Mr. Paul Waterhouse for his admirable paper, and he should also like to couple with that vote of thanks an expression of their indebtedness to the President for the way in which he had read the paper, and a vote of condolence with Mr. Paul Waterhouse on the cause of his absence. One of the things that struck him most in the paper was what Mr. Waterhouse had said about architects' restrictions. He (the speaker) thought that restrictions were their salvation very often. Nothing was more difficult than to design a building for an imaginary site, with a perfectly free hand to do just what one liked. There was nothing to start from, nothing to aim at, and nothing to be overcome. Mr. Waterhouse had said that it was a most difficult thing to overcome a problem of that sort if one had unlimited money. If they had an unlimited site and unlimited money, it was very nearly as awkward. If they had an awkward-shaped piece of ground, it was sometimes difficult to know how the building was to be placed upon it; but the very difficulty imposed by the problem led to its being so carefully considered that the building gained by it. He had certainly gained a great deal of instruction from the paper, which was full of thought, and contained a great deal of information admirably put. It might home to them various truths which they might otherwise have overlooked. He had no criticisms to offer upon the paper, for he agreed with almost everything that Mr. Waterhouse had said.

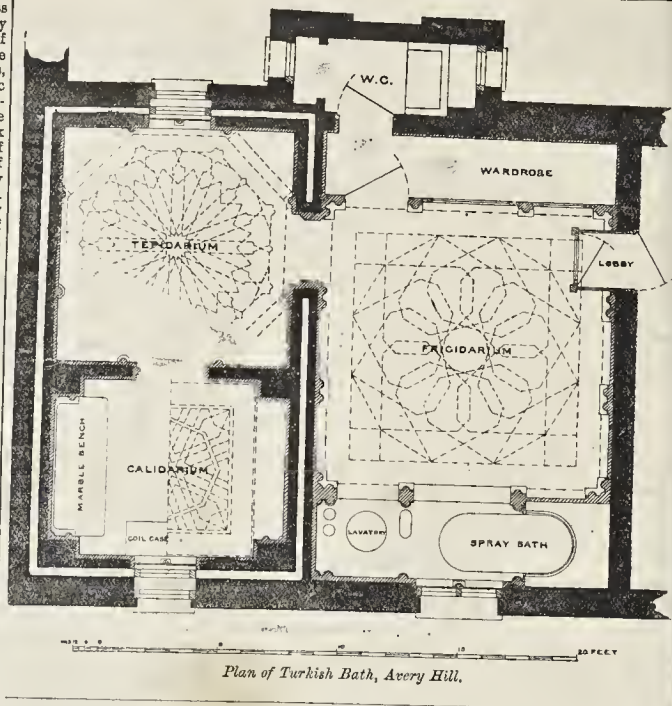
Mr. F. R. Farrow said he had very great pleasure in recording the vote of thanks. Mr. Waterhouse, in the paper which he had submitted to them that evening, had brought to their notice some of those mysteries which were great puzzles. It had always been one of the greatest puzzles, or mysteries, in connection with architecture to arrive at any conclusion whatever as to the manner in which public opinion, or public appreciation, was based. He quite agreed with what Mr. Waterhouse had said as to public opinion existing in the time when the best architecture was done, in the time of Pericles, or in the time of the early Italian Renaissance. For his own part he did not think that the public of those times appreciated architecture more than the public of the present day. He was inclined to go a step further, and to say that he did not think that the architects themselves appreciated to its fullest extent the work they were doing. It always seemed to him that when a man was really making an artistic work, whether of architecture, or of painting, or sculpture, or anything else, that he was not thinking of the analytical problems to which Ruskin and other writers had devoted themselves. The critic looked at the artist's work with a view to seeing why it was beautiful. When reading Ruskin's description of the motives which actuated Turner in painting his pictures, it always struck him (the speaker) that Turner never thought a bit about those things. The same thing applied to architects. They did not trouble themselves why they did this, that, or the other. When they made a design they made it to satisfy their judgment. It came into their heads and they did it. If that was the case with the artistic producer, it must surely be much more so with the art-appreciating public. The public did not appreciate art from any logical process of thought. Their

appreciation was probably due to some process of thought in their minds, but at any rate they were not conscious of it. The best way out of the difficulty, he thought, was to adopt the theory given by some modern psychologists, that the production or appreciation of artistic work was the result of sub-conscious cerebration. That, he believed, was the secret of the production of artistic design,—of artistic work of any sort. That helped them out of a good many difficulties in the matter of education. It showed them at once the fallacy of saying that an artist was born and not made. They generally found that men with the ability to produce artistic work, not being conscious of the way in which they made artistic designs, came to the conclusion that the power of production which they possessed was born in them. To his mind that was quite a mistaken idea. That power was the outcome, really, of a large accumulation of material, which had been stored in their brain or mind, whichever they liked to call it, as the result of study and work and observation. All that they had studied was drawn upon, and fused and brought out again in new designs. It was always found that men who produced the best work in any branch of art were the men who had done the most study. If it was simply a matter of being born an artist, and not being made, we should find that men would produce very fine work without doing very much study; but that was exactly contrary to all their experience. They knew that the men who were at the top of their profession or art with regard to their artistic productions were men who had devoted an enormous amount of hard work to the study of what had been done before them; so that although they did not consciously make use of the result of that study, there was no doubt that they did sub-consciously make use of it. In that way, he thought they could dispose of the doctrine which was so dangerous to the young men of the Association, regarding their art, that an architect or artist was born and not made. If they wanted to be thoroughly first-rate men, they must work thoroughly hard to obtain the material of which their designs were going to be made. The relation between music and architecture was one upon which Mr. Waterhouse had touched several times, and he had shown them that there was a close analogy between the two arts. He (the speaker) thought that that was an analogy which could hardly be pushed too far. Mr. Waterhouse had mentioned the qualities which they called proportion, repetition, and rhythm, as to which there could be no doubt whatever that their function in music was very similar to their function in architecture. He thought that they need not despair that as time went on, and the public were educated up to appreciating good architecture by seeing more of it before their eyes, that they would at length attain a highly desirable state when good architecture alone would be tolerated in our country. That might take time, because hereditary influence would have a great deal to do with it, but as the children and grandchildren of the present generation were growing up, in course of time there would be a better appreciation of the work of good architects.

Mr. Hampden W. Pratt and the President having made a few remarks, the vote of thanks was put by Mr. Stokes and carried, and the meeting then terminated.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.—This Commission stands adjourned until the middle of December. We have in type a report of some of the evidence taken at its last sittings, but we are obliged to hold it over this week, owing to pressure of other matter.

"FENNER'S" GROUND, CAMBRIDGE.—The authorities of Gonville and Caius College offer to sell, provided that their offer be accepted before the close of the current year, the freehold of the University cricket and athletic ground, commonly known as "Fenner's," and lying near the railway station on the outskirts of the town, for 12,000l. The Purchase Committee have in hand 6,000l., being the accumulated savings of the cricket and athletic clubs; promised subscriptions amount to 2,750l., a sum which they hope will be speedily increased by a further sum of 1,250l., so that they may, at their meeting on December 7 next, feel able to agree to these terms. In that case the balance, together with 800l. for contingent expenses, would depend upon additional contributions, or remain upon mortgage. The Board of Agriculture have agreed to the sale, and the purchase must be completed before the end of 1894.



Plan of Turkish Bath, Avery Hill.

Illustrations.

TURKISH BATH, AVERY-HILL.

THE illustration, from a drawing exhibited at the Royal Academy this year, shows the Turkish Bath at Avery-Hill, square on plan, and octagonal from the arches up to the ceiling,—the Calidarium being seen through the archway.

The Turkish Bath in this mansion consists of three rooms. First, the Frigidarium, or cold room, entered by a lobby with double doors from a dressing-room. The floor of this room is of red and white marble of elaborate design. The walls to the springing of the arches are lined with statuary, having, the bases, shafts, and carved caps of columns of red marble. The screen to the spray bath and lavatory is of marble. The partition to the wardrobe lobby is formed of Spanish mahogany between the marble columns, the lower panels being richly carved with flat ornament, and the upper part filled with stained glass of Moresque design. The arches, spandrels, and ceiling are executed in glazed Burmantofts faience, in white and two shades of red. The fittings to the bath, lavatory, doors, &c., are silver plated.

From the Frigidarium a doorway, hung with heavy portières, leads into the Tepidarium, or warm room, the floor of which is of grey and white marble. The plinth, bases, shafts, and caps are of white marble, and the walls and ceiling of glazed faience, in shades of blue, green, grey, and white.

From this room the Calidarium, or hot room, is entered, with a floor of similar grey and white marble, and walls,—to the springing line,—seats, and pierced coil case of white-veined marble, the upper part being of glazed faience, in shades of green, blue, grey, and white.

It was intended to have glazed the inner windows of this room with a thin slab of Mexican onyx marble. The design and the whole of the large and full-sized details of every part were prepared by the architect, Mr. T. W. Cutler.

WINDOW, BURFORD CHURCH, TENBURY.

This illustration is from a pencil-drawing made by Mr. G. W. Rhead, and exhibited under his name at the Royal Academy, of a window designed by Mr. James Powell, of Whitefriars, for a Jesse window, which was fixed this summer

in Burford Church. The style of the design was in some degree suggested by a German treatment of this class of window, seen at Ulm, and elsewhere.

The tone of the window is rich and glowing, as demanded by its position under the arch of a west tower. The "tree" is of varied shades of gold got by the use of silver stain, the groundwork a deep blue patterned; the dresses are richly diapered, the ruby and some of the blue accented out of the glass. The effect is very rich, though only a few colours were used, and eight different glasses at the most. Each light has double iron stanchions and four saddle-bars.

AN ARTIST'S HOUSE AT CROYDON.

This house, which is built on the chalk hills at the southern part of the town, is so planned that every room gets a share of sunshine and a good view, and there is not a dark corner in it. Excepting the chimney-stacks, which are of red brick, it is built of local stocks rough cast. A little half timber work is introduced in the smaller gables. The larger gables are hung with Sussex tiles. It will be noticed that the plan is very simple, being practically under one ridge, and that the fireplaces are so arranged that the eleven flues are contained in two stacks. Hot-water coils are placed in the north window of studio and in the hall. For so small a house the hall is spacious; from it a short and wide flight of steps leads to the studio. The cost, including about 60l. for fencing, was under 1,100l.

The architect is Mr. C. Henman, and the drawing was exhibited at the last Royal Academy Exhibition.

NOS. 39 AND 40, MARGARET-STREET, CAVENDISH-SQUARE, W.

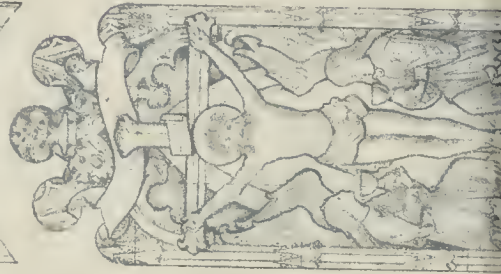
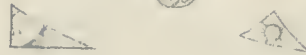
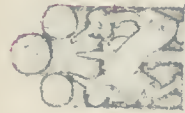
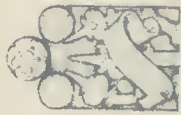
THESE two houses, situated within a few doors of Regent-street, were designed to meet the requirements of medical men.

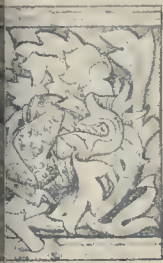
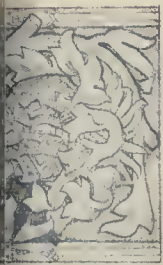
The plan of No. 40 is somewhat peculiar in dispensing with the usual small room behind the dining-room, which in a house of 19 ft. 6 in. frontage is almost useless, and which of necessity becomes a passage-room to the third room behind. By this means a small ball is gained, out of which the staircase starts, thus cutting off the basement entirely from the upper part of the house.

In order to obtain a broad effect in the front



THE BUILDER, NOVEMBER 26, 1892.





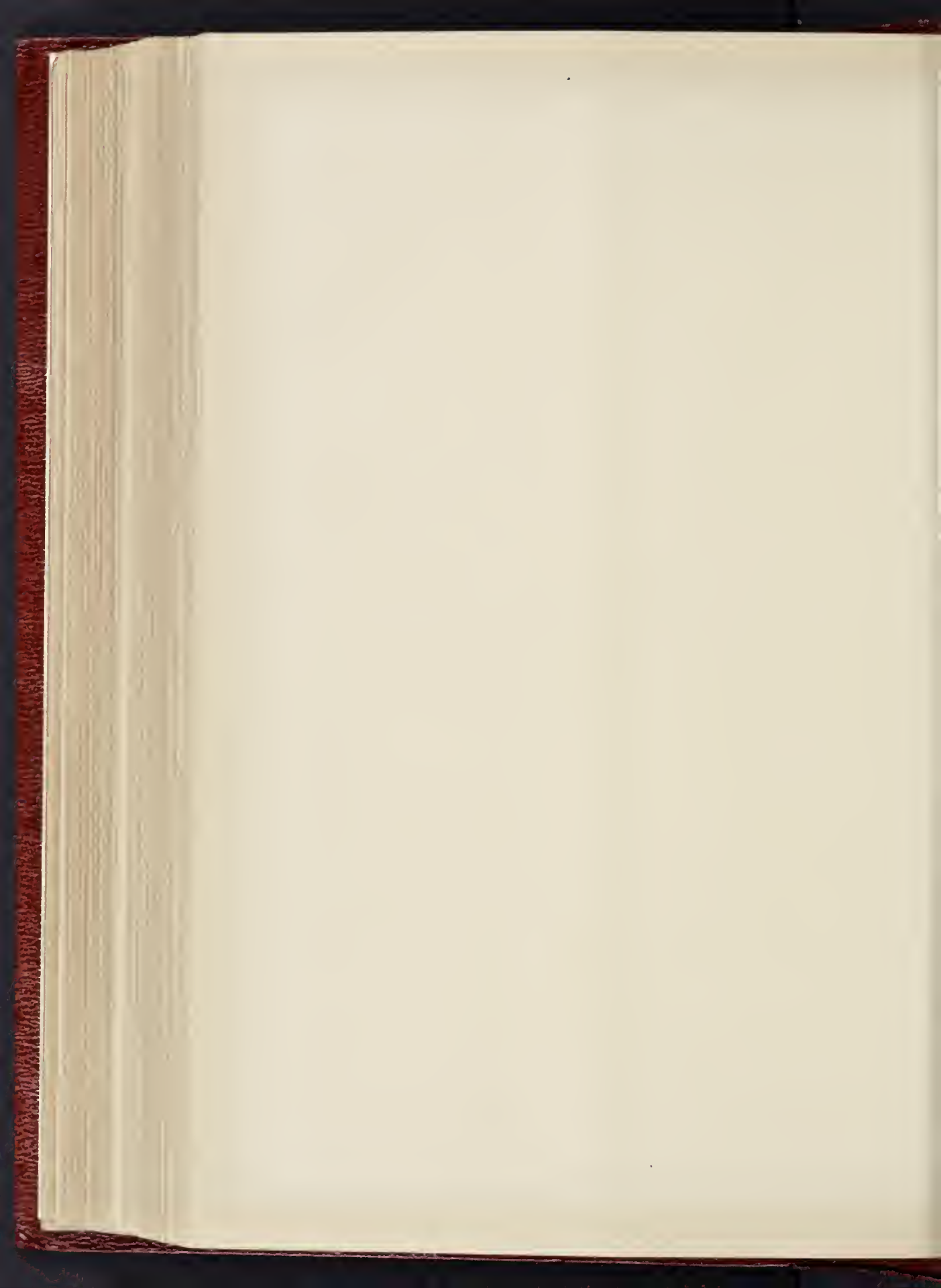
←----- 1' 7 1/8" ----->



1/2" PHOTO BRACKLE & CO. 4 & 5 EAST WARDING STREET, LEITCH, JAN. 1892

WINDOW FOR BURFORD CHURCH, TENBURY.—DRAWN BY MR. G. W. KHEAD, FROM THE DESIGN OF MR. JAMES POWELL.

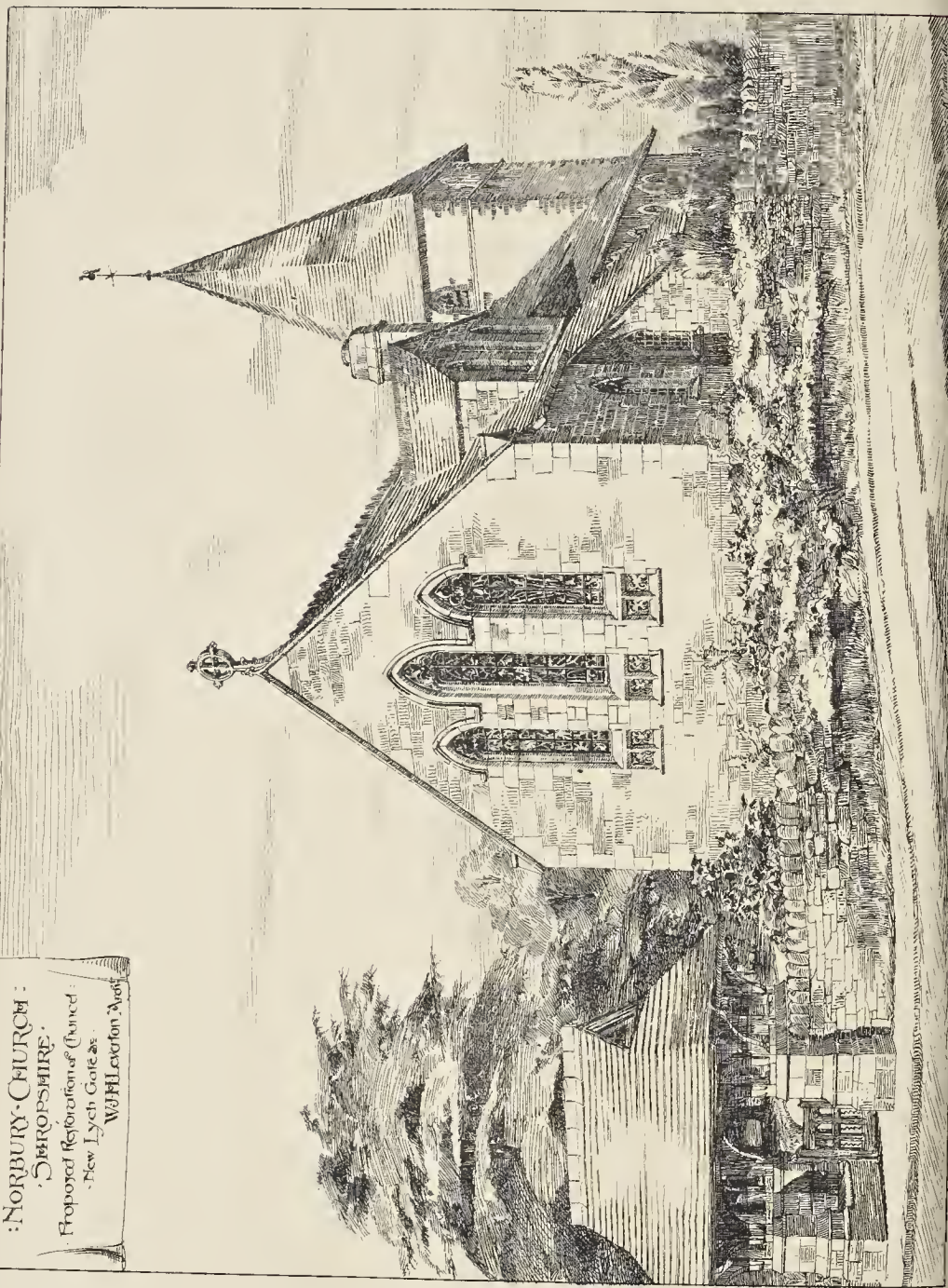
Royal Academy Exhibition, 1892





THE BUILDER, NOVEMBER 26, 1892.

NORBURY CHURCH,
DERBYSHIRE.
Proposed Restoration of Church
New Lych Gate &c.
WILLIAM LAYTON, Architect.





THE BUILDER, NOVEMBER 26, 1892.

AN ARTIST'S HOUSE
AT CROYDON

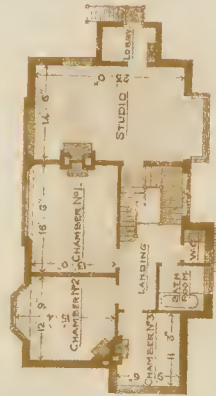


BACK VIEW.



GROUND FLOOR PLAN.

FRONT VIEW.



FIRST FLOOR PLAN.

END VIEW.



SECOND FLOOR PLAN.

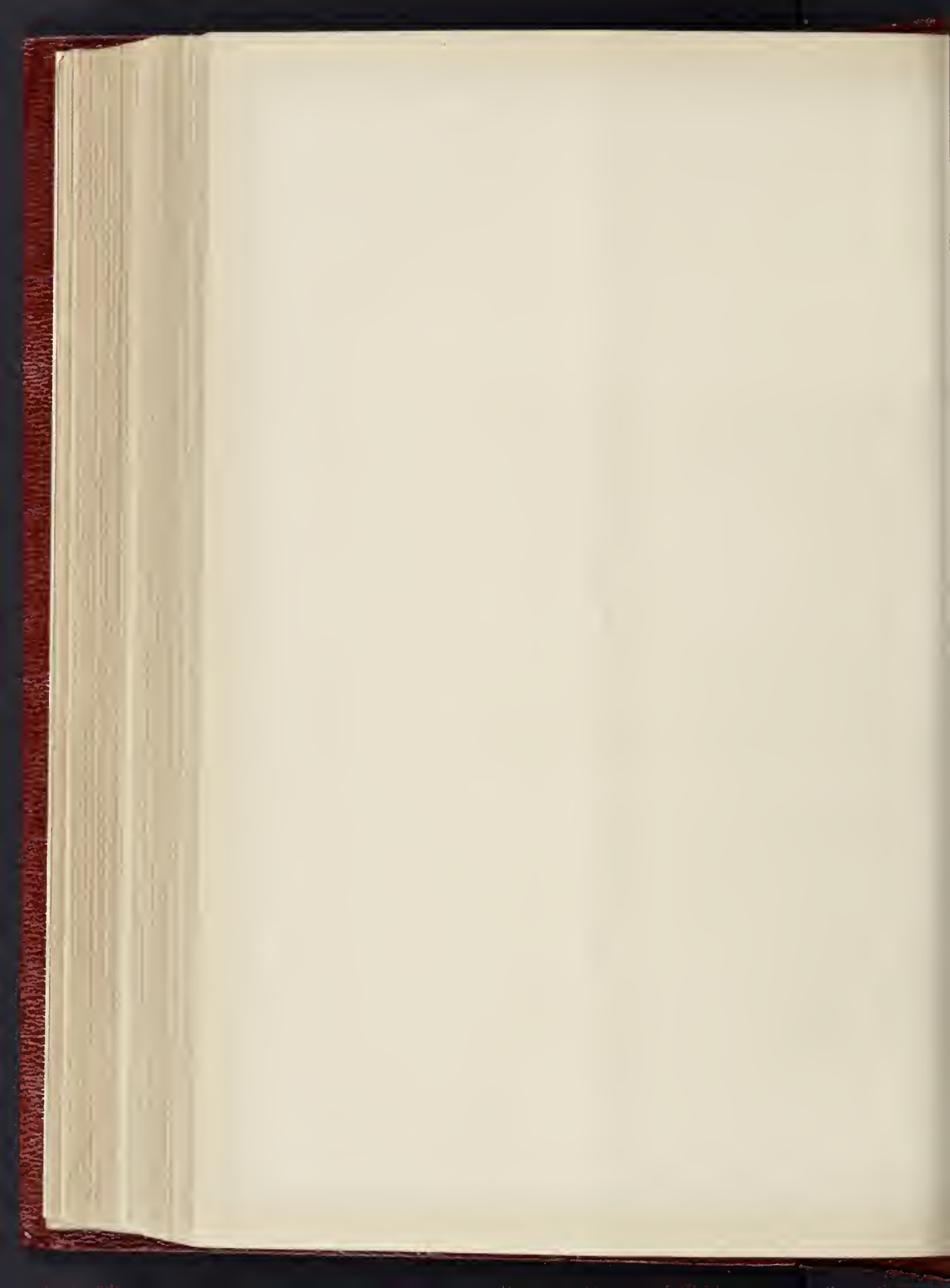
Charles Kemmerly
65 Cannon St. E.
London



Frank L. Pearson

Wm. PHOTO SPRADUE & CO. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

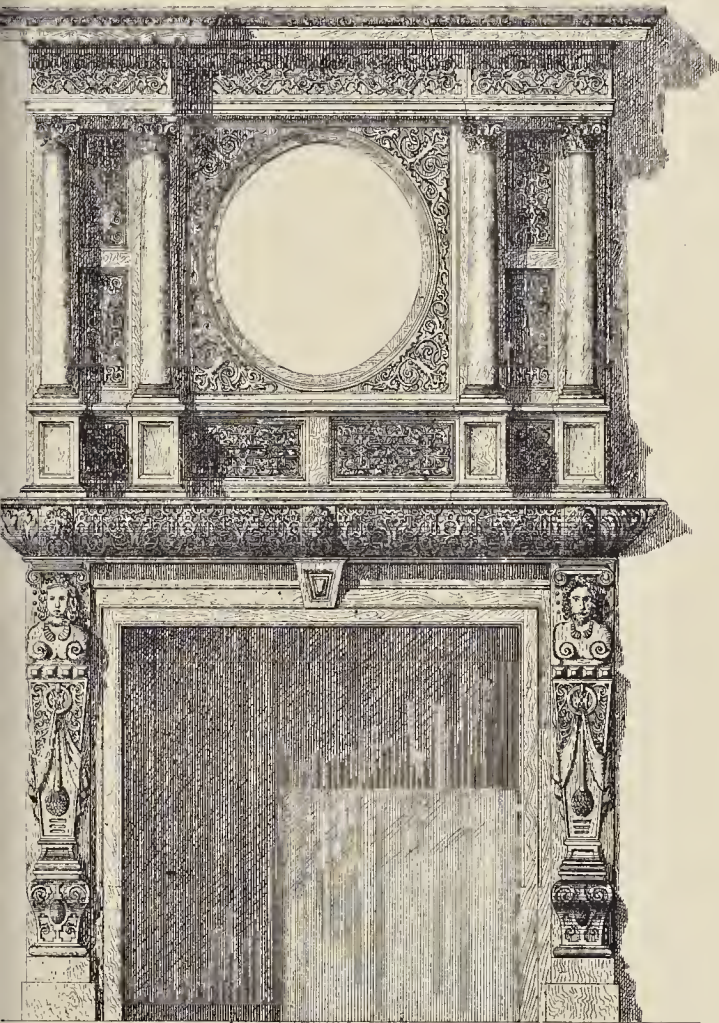
Nos. 39 & 40 MARGARET STREET, CAVENDISH SQUARE.—MR FRANK L. PEARSON, ARCHITECT.



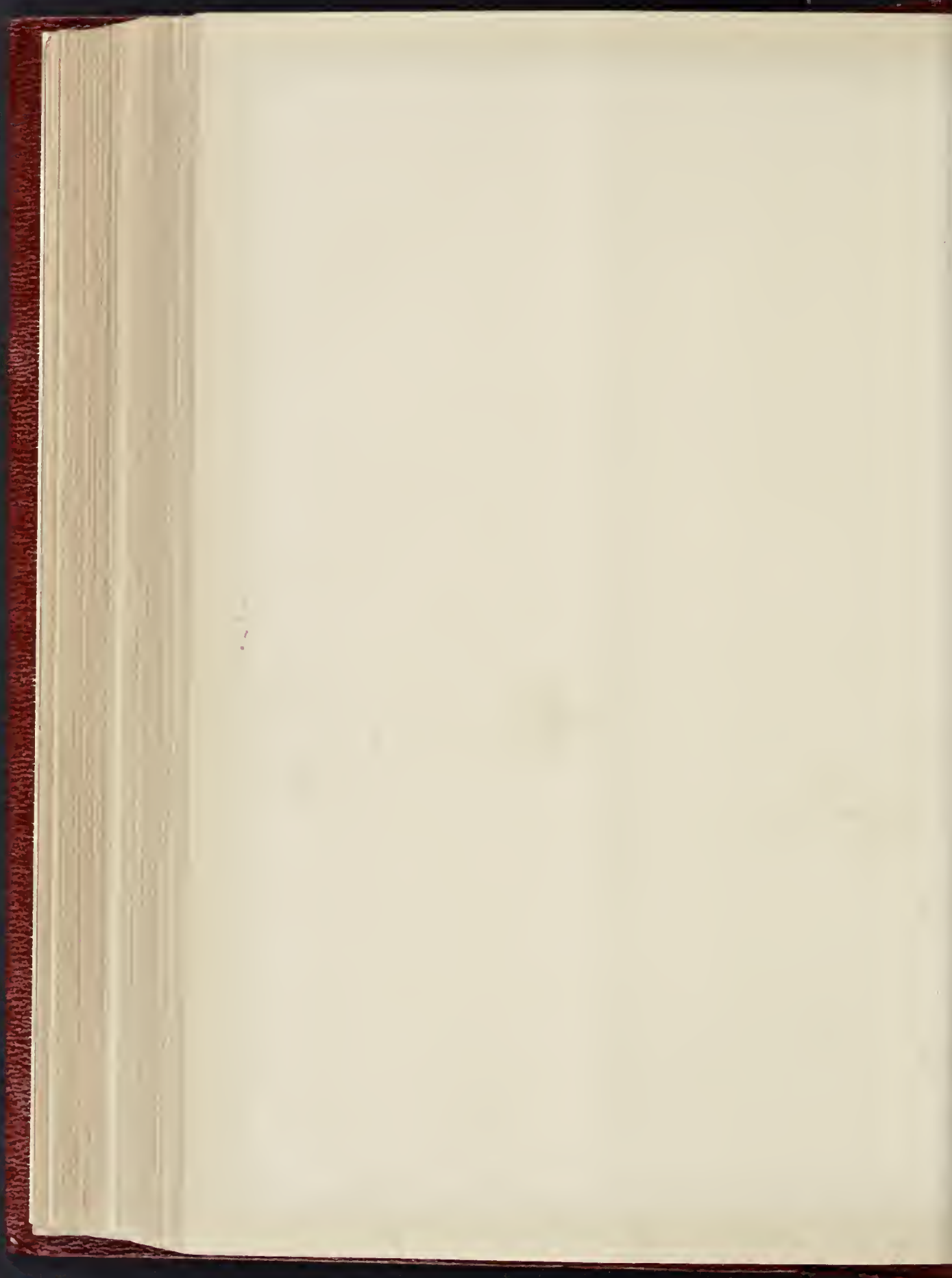
LIBRARY · FIREPLACE · KIPLIN · HALL ·

NORTHALLERTON ·

executed in oak for Vice Admiral Carpenter.



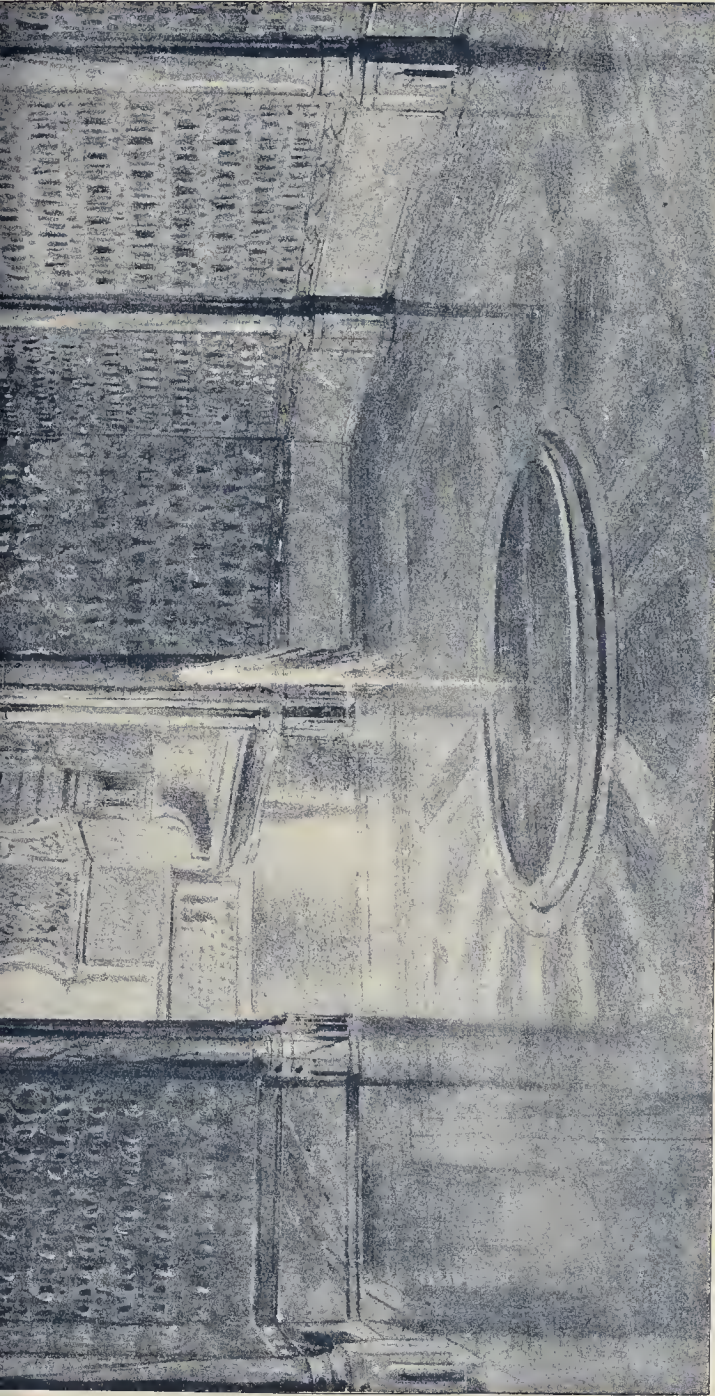
James H. Hendry Archt.
58 Chancery Lane
London W.C.





THE BUILDING, NOVEMBER 26, 1892.

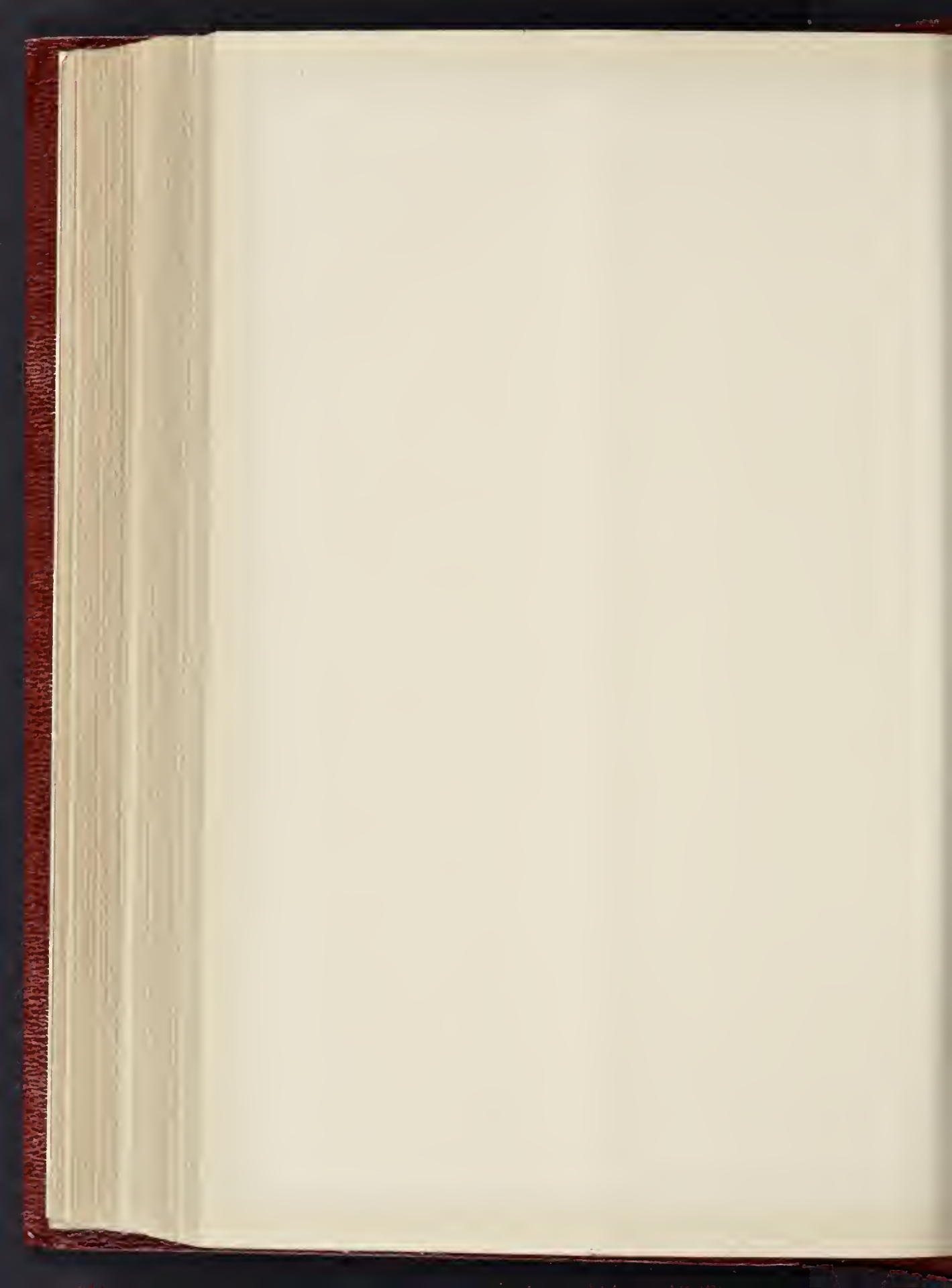


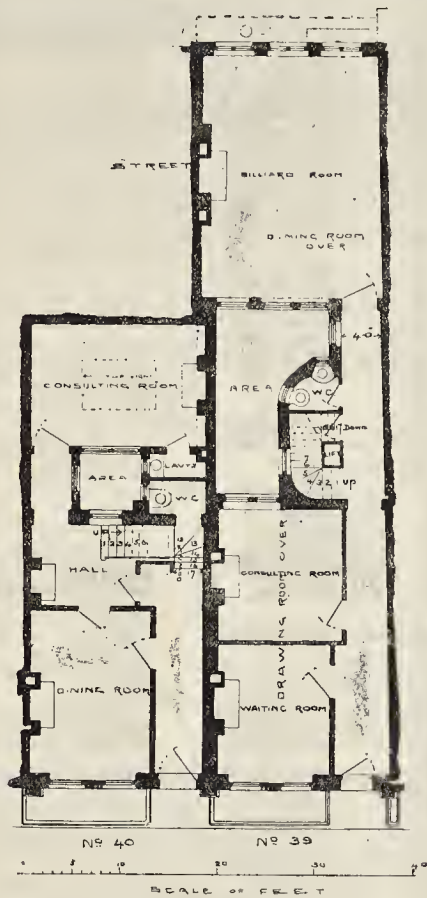


INK PHOTO SPRAGUE & CO. 245 EAST HAWKING STREET, DETROIT, MICH. U.S.A.

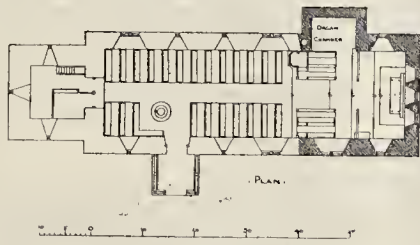
INTERIOR OF TURKISH BATH, AVERY HILL.—MR. THOMAS W. CUTLER, F.R.I.B.A., ARCHITECT.

Royal Academy Exhibition, 1892





Plan of Houses in Margaret-street.



Plan of Norbury Church.

levation the two houses have been combined under one gable. The work is carried out entirely in red brick, with the exception of the jambs of the front door, which are in red Mansfield stone; the moulded and ornamental parts being in gauged brick of a similar colour to the facing. The architect is Mr. F. C. Pearson, and the drawing was exhibited at the last Royal Academy.

NORBURY CHURCH, SALOP.

THE nave of this church was restored about 20 years ago by the late Mr. Henry Curzon. He states of the funds did not allow of the chancel being done then, but a recent legacy was enabled it to be taken in hand. The old walls were in such a bad state that it was found necessary to entirely rebuild them. There are no features of any interest, and no

vestiges that would give any clue as to what the building was originally like were discovered. The work is, therefore, not a restoration, but an entirely new design.

The walls are of local stone, with dressings of Grinshill stone, and the roof is covered with Broseley tiles. The chancel stalls, sorsen, and pulpit, and the exposed portions of the roof, are of English oak. The east window will have stained-glass by Messrs. James Powell & Sons, who are also preparing the mosaic panels for the reredos. The builder is Mr. Herbert Jukes, of Hopton Castle, and the architect Mr. W. J. H. Leverton, of London.

LIBRARY, FIREPLACE, KIPLIN HALL, NORTHALLERTON.

This is a fireplace in Late Renaissance style, in wood with a good deal of carved surface

ornament, kept flat in style so as not to interfere with the outline of the work. It is from the design of Mr. J. H. Hendry, architect.

THE LABOUR COMMISSION: BUILDING TRADE EVIDENCE.*

THE section of the Commission dealing with the textile, cotton, building, and miscellaneous trades, met at the Commission Room, Westminster-hall, on Tuesday last, Mr. Mundella, M.P., presiding, the other Commissioners present being Mr. M. Austin, Mr. G. Livezey, Mr. E. Trow, and the secretaries, Messrs. John Burnett and Geoffrey Drage. We quote the following from the *Times*' report:—

Colonel Stanley Bird, Mr. J. Mowlem Burt (of Mowlem & Co.), Mr. G. Grover, Mr. H. J. Wright, and Mr. J. H. Bridgman, representing the Central Association of Master Builders, gave evidence in contradiction and expansion of statements made to the Commission by representatives of the workmen. The suggestion that there was no Government inspection, said Mr. Mowlem Burt, was incorrect, as the inspector visited his works once or twice a year, and had in one case ordered him to put up fencing to protect the men against danger from machinery. He also asserted that it was not true as had been stated, that the men might be employed more regularly if the employers cared to employ them. It was always the interest of the employer to keep the men at work, especially the good workmen. He complained that the trade unions did not take care only to admit competent workmen, as the builders knew to their cost, and it was generally the inferior workman who was the most active in stirring up strife between employer and employed. He urged upon the Commission that any trade unionist who objected to work with a non-unionist, or who coerced, boycotted, or "blacklegged" a fellow-workman should be made amenable to law. He regarded the sub-division of labour in the building trades as an advantage. As to the relations between employer and employed, he was afraid there was not that cordiality between them that there ought to be, as the men were still animated with a desire to get all they could irrespectively of whether their employers got anything or not.

Mr. Mundella: And I suppose the employers are animated by the desire to get all they can? —The witness said that possibly might be the case, but he did not think they carried it to the same extent as the men. He contended that trade unions had either not enough or too much power. They had power to order the men to strike, which order was readily obeyed by the men, but when they ordered the men to go back to work upon an understanding being come to, the men did not so readily acknowledge the authority of the union.

Colonel Stanley Bird, in reply to Mr. Mundella, as to whether there was not a good deal of inferior building in London, said that in regard to buildings which were erected under contract with an architect and a clerk of works "scamping" did not go on, but in the case of speculative building, which was only subject to the supervision of the District Surveyor, there was no doubt that it did prevail.

Mr. Mundella: I presume you are acquainted with some of the buildings in the large West-end districts of London, where there are houses built on a large scale with high rents, and that those buildings are very bad as regards the ceiling and the plaster work, and that great divisions and cracks are soon to be discovered? —The witness admitted that there were a good many of such buildings, which after a dozen years or so almost wanted rebuilding, but he insisted that such were "jerry-built," by speculative builders for the purpose of letting. He complained that trade unions, by insisting on a minimum wage to workmen, whether good or bad, dragged all men down to a dead level, and said that now that the London County Council and other public bodies were undertaking their own building operations the master builders would soon have to come to a stop. The allegation that master builders were careless of the lives of their workmen in consequence of being able to insure themselves against accident, he said, was untrue. As to the proposed inspection of scaffolding by a State inspector, he said he would rather that the responsibility should

* For reports of previous sittings of this Commission when building trade evidence was taken see *Builder* for March 5, 1892, p. 184; and for Mar. 12, 1892, p. 244.

be thrown upon the men, because they would have a personal interest in seeing that it was safe. At his own works notices were posted asking the men to assure themselves that the scaffolding and plant were in good condition, and stating that notice should be given to the employer if anything defective were discovered.

Mr. Mundella pointed out that it was practically impossible for every individual workman who was employed on a large job to see that the scaffolding was entirely sound.

The witness, continuing, said that a workman did not do half the work now that he formerly did in an hour, notwithstanding the increased wages he received and the greater purchasing value of those wages. The workman did not give his best energies during the hour, and this statement was borne out by every builder in London. Instead of doing a fair hour's work, he did as little as he could.

Mr. Mundella: That is rather a serious allegation.—Very serious, but I make it with full knowledge of what I say. We get a good deal less work out of the men now per hour than we ever did. A bricklayer would formerly lay 1,000 bricks in a working day of ten hours, but now a man will not lay more than 300 to 400 bricks in a day of nine hours. The letting of brickwork was now at 90s. a rod, instead of from 30s. to 40s., and in the joinery trade, from the same cause, it cost as much now to produce the same work by machinery as when the men had to do the whole of the work by hand.

Mr. G. Dew, of the London Building Trades' Committee, and Mr. F. C. Barton, a member of the S'rike Committee of Carpenters and Joiners, detailed the circumstances of the late s'rike in the London building trades from the men's point of view, alleging unreasonableness on behalf of the masters in refusing to meet the men, though they admitted that the first definite offer of arbitration came from the masters. Asked if they were willing, on behalf of the men, in the case of any future dispute to refer the matter to an equal number of representatives of each class with an impartial arbitrator, Mr. Dew said he would not like to say so, as the workmen felt they were so terribly sold in the last arbitration, though personally he had no fear of the result if the arbitrator was an impartial man. The men had now an advance of a halfpenny an hour, secured by mutual agreement from the masters, and a forty-eight hours week taking the year round.

THE LONDON COUNTY COUNCIL:

SCHEME FOR CARRYING OUT WORKS WITHOUT THE INTERVENTION OF A CONTRACTOR.

The usual weekly meeting of this Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Tenders for reconstructing a portion of the Ingotte Sewer were opened by the Chairman, and referred to the Main Drainage Committee. (The list appears on another page under the heading "Tenders.")

The greater part of the sitting was occupied by the discussion of the following important report, presented by the General Purposes Committee, on the proposed scheme for carrying out works without the intervention of a contractor:—

"We have, in accordance with the resolution of the Council of October 18," considered the best manner in which works can in future be carried out, and we now report the conclusions at which we have arrived, together with proposals as to the necessary organisation and staff.

(a) As to the Council and Committees.—We are of opinion that, instead of appointing a new Committee, the existing Stores Committee should be reconstituted, so as to represent more Committees than at present, and that there should be entrusted to it the present duties of the Stores Committee as to the purchase of articles required for general use, and, in addition thereto, the whole question of purchase and storage of, and the general superintendence of all stores and store-keeping at the various depots in the metropolis. To these would also be added the new duty of carrying out the works resolved upon by the Council.

Our reasons for the above suggestion are that, in the first place, the present arrangements for store-keeping are very unsatisfactory. There are various depots in different parts of the metropolis of greater or less importance, managed by storekeepers of varying capacity, under in some cases the Architect, and in others the Engineer. The store-

clerks carry on their work independently, and the only check upon them is that the Comptroller is directed to arrange for the system of store-books, the method of keeping accounts and the annual stock-taking, reporting on these points to the Finance Committee. We think that it would be an improvement to remove the whole organisation out of the Comptroller's department, leaving to that department only the duty of conducting the annual stock-taking and audit. It is necessary, therefore, to organise the store-keeping on a new basis, and this would probably best be done by constituting the arrangement thereof to the Chief Officer of the new department, who, with the aid of proper assistants, would thoroughly overhaul and direct the system of store-keeping at the depôts, and also would be capable of advising the Committee on all questions of purchase of stores, plant, and material.

Our second reason is that a large portion of the work of the new Works Committee would consist in the purchase of plant and material, and the provision of yards, &c., for keeping such plant and material. For this purpose the Committee would of necessity have to organise a system of store-keeping in respect to their works, and it would be but a slight extension of their work to include the supervision also of stores, &c., for ordinary use.

We recommend:—

1. That the Stores Committee be reconstituted, and that the new Committee be named "The Works and Stores Committee," and do consist of fifteen members, viz.:

- 1 representative from the Asylums Committee.
- 1 " " " Bridges Committee.
- 1 " " " Corporate Property Committee.
- 1 " " " Establishment Committee.
- 1 " " " Finance Committee.
- 1 " " " Fire Brigade Committee.
- 1 " " " Highways Committee.
- 1 " " " Improvements Committee.
- 1 " " " Industrial Schools Committee.
- 1 " " " Main Drainage Committee.
- 1 " " " Parks Committee.
- 1 " " " Public Health Committee.

And three to be elected by the Council.

2. That the respective functions of the different Committees be definitely settled by the enactment of the following standing orders:—

(a) Every Committee recommending the execution of any works shall state whether they propose that the works shall be executed by a contractor or by the Council without the intervention of a contractor, and, if the latter course be recommended, they shall lay before the Council full plans, specifications, and estimates of cost of the proposed works. This standing order shall not at present extend to works of ordinary maintenance or repair.

(b) When the Council resolves to execute any works without the intervention of a contractor, the plans and specifications shall, unless otherwise ordered by the Council, be thereupon referred to the Works Committee. If either the plans, specifications, or estimate of costs appear to be inaccurate or insufficient, the Works Committee shall report to the Council accordingly, and the matter shall be referred back to the originating committee to bring up amended particulars.

If or so soon as the Works Committee are satisfied as to the accuracy or sufficiency of the plans, specifications, or estimates, they shall report to the Council to that effect, and shall proceed forthwith to carry the works into execution.

(c) No question shall be raised by the Works Committee except as to the accuracy or sufficiency of the plans, specifications, or estimates, nor shall the Works Committee be at any time entitled to vary the plans or specifications, except upon the advice of the Engineer or Architect, and in communication with the originating Committee, and after reporting the same to the Council.

Nothing in this order shall prevent the Engineer or Architect, or the Works Committee, from taking action in cases of emergency not admitting of delay; but such action shall be reported to the Council forthwith.

3. That the order of reference to the Works and Stores Committee be as follows:—

(a) The Committee shall carry into execution all works which the Council resolves to execute without the intervention of a contractor.

(b) The Committee shall have the control of the staff exclusively employed in connection with the works of construction and repair undertaken by them.

(c) The Committee shall consider and report to the Council as to the provision of store-yards and workshops necessary for carrying out the works committed to them.

(d) The Committee shall control all store-yards, workshops, and store depôts of the Council, and shall carry out the regulations of the Councils as to store accounts, tenders for stores, and the ordering, issue, and condemnation of stores.

(e) When the Council shall have resolved to execute any works without the intervention of a contractor, and shall have passed the necessary estimate of the cost of such works, the Committee shall have power to contract, on behalf of the Council, for the supply of plant and material, provided that the amount of the contract does not exceed 500*l.*, and provided that no contract be entered into by the Committee which shall cause the above estimate to be exceeded without the special authority of the Council, and provided also that no contract involving an expenditure of more than 100*l.* shall be entered into except after public advertisement.

(f) The Committee shall keep separate accounts of liabilities entered into in connection with each work, and information of every liability entered into shall be reported forthwith to the Comptroller of the Council.

(g) The Committee shall undertake the preparation of the schedules and the consideration of the tenders for all goods supplied to the Council.

(h) The Committee shall consider all questions as to contracts for general repairs.

4. That, as a consequence of the foregoing transfer of

reference, the reference to the Finance Committee amended by withdrawing from that Committee duty of carrying out the regulations of the Council to stores, with the exception of the duty of making provision for an annual stocktaking and audit by Comptroller's department.

(b) As to the Staff.—We recommend:—

"5. That a new department be established, to be called the Works Department," and that there be entrusted to that department the execution of all works upon plans prepared by the Engineer or the Architect and the custody and regulation of the Council's stores.

6. That the salary of the head of the department be fixed at 1,000*l.*, and the qualifications for the post be thorough experience of the purchase of material and plant, and the carrying out of large works under some well-known contractor.

7. That the head of the department be styled "Chief Officer of the Works Department," and be appointed under the Works Committee for:—

(a) Advising as to the purchase of stores, plant, and material.

(b) The execution of all works carried out by the Works Committee on behalf of the Council.

(c) The employment and supervision of all officers and workmen in his department or employed on works.

(d) The regulation and direction of all store-yards, depôts, and workshops belonging to the Council.

8. That a central store-yard be provided, and that the staff at present employed at the County Hall under the Comptroller be removed thereto, and cease to form part of the Comptroller's Department.

The Department, viz.:

- Engineering Branch.
- Building Branch.
- Stores Branch.

10. That the subordinate staff of the Works Department be as follows:—

- (a) General.—
- One 1st-class clerk at the commencing salary of £200
- 3rd 100
- (b) In the Engineering branch.—
- One engineer salary £400
- One cost clerk 250
- Gangers, foremen, and labourers as necessary arising.
- (c) In the Building branch.—
- One principal assistant for building 250
- Pricing clerk salary £200
- Measuring surveyor 200
- Foremen and labourers as necessary arising.
- (d) In the Stores branch.—
- One principal storekeeper at the commencing salary of £150
- One 3rd class clerk 100
- Store clerks at the various depôts.

In the event of the above recommendations being adopted, we further recommend:—

"11. That the several Committees concerned be requested to appoint their respective representatives of the new Works and Stores Committee before December 6, and that until that date the Stores Committee do continue in office and proceed under their present order of reference."

Mr. Benn, M.P., the Chairman of the Committee, in introducing the report, said that counsel's opinion had been taken as to the legality of the proposals of the Committee, Sir Horace Davey and Mr. Haldane, Q.C., having given opinions which fully warranted the Committee in presenting their proposals to the Council. He explained that the proposed new department would stand in all respects in the relation of a contractor, and would be subject, just as outside contractors were, to the control and supervision of the Superintending Architect, the Chief Engineer, and other officers of the Council.

Mr. Fardell moved the following amendment:—

"That, inasmuch as the Council possesses no express statutory power authorising it to establish a works department having for its object the execution of all works not yet sanctioned by Parliament, the further consideration of the report be postponed until such time as express powers are granted to the Council by Act of Parliament."

This was seconded by Mr. Matthews. After a long discussion, the Council divided, when there was voted: For the amendment, 28, against it, 82; majority against the amendment, 53.

In the course of some further debate on the detailed recommendations of the report, it was resolved that the proposed title of "Chief Officer of the Works Department" should be changed to "Manager of Works and Stores," and that the salary should be 700*l.* a year, instead of 1,000*l.*, as proposed by the Committee.

The recommendations of the Committee as amended were then agreed to, and the following resolution was also adopted:—

"That the several committees concerned be requested to appoint their respective representatives on the new Works and Stores Committee before December 6, and that until that date the Stores Committee do continue in office, and proceed under their present order of reference."

The following additional reference to the

* See Builder for October 22, pp. 321, 322.

committee was also (despite some opposition) adopted, on the motion of Mr. Westcott:—

"The Committee shall, on the completion of the works referred to them, forthwith report to the Council that such works are completed, with particulars of the estimated and actual cost thereof."

After transacting some other business, the Council adjourned to an extra meeting to be held this Friday, the 25th.

ARCHITECTURAL SOCIETIES.

THE (LONDON) ARCHITECTURAL ASSOCIATION.—At the ordinary fortnightly meeting of the Association, held in the meeting-room of the Royal Institute of British Architects on the 8th inst., Mr. H. O. Cresswell, President, in the chair, the following gentlemen were elected members, viz., Messrs. O. G. Crockett, O. Little, W. Newham, and G. H. Allison. The senior honorary secretary, Mr. E. S. Gale, having announced donations to the library and the President said he was sure they would all be sorry to hear that their Vice-President, Mr. Paul Waterhouse, who was to have read his paper to them that evening, would be unable to be present, as he was suffering from an attack of bronchitis. But Mr. Waterhouse had sent his paper to him (the President), and had asked him to read it. The President then read Mr. Waterhouse's paper on "Some Mysteries of Modern Architecture," which we print in other of our columns this week.—The first meeting of the Discussion Section for the session 1892-93 was held in the rooms of the Association at No. 56, Great Marlborough-street, W., on Wednesday, the 16th inst., when a paper was read by Mr. Theo. Moore, A.R.I.B.A., entitled "What Makes a Building Artistic?" The paper was well received, and a good discussion followed. There was a large attendance, and the session promises to be very successful, as a good set of papers are promised.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The annual conversation of this Association was held on the 15th inst., at the Grand Hotel, Birmingham. The proceedings opened with a reception by the President (Mr. William Hale, F.R.I.B.A.). During the first hour those present were afforded an opportunity of inspecting the collection of drawings which had been got together for the occasion, prominent among them being the drawings of the new Assizes Courts, by Mr. Aston Webb; some examples of pen-and-ink drawing, by Messrs. C. E. Mallows, Ernest George and Peto, E. J. May, H. H. McConall, E. C. Bewlay; and water-colour drawings and sketches, by Messrs. W. H. Bidlake, G. A. Cox, and R. Phené Spiers; whilst Mr. Hale sent a design for a new church at Storch Street, and Mr. C. E. Bateman some pencil sketches of domestic work. Drawings were also sent by Mr. E. R. Taylor and Mr. J. Pratt. The reception was followed by a concert.

GLASGOW INSTITUTE OF ARCHITECTS.—A general meeting of this Institute was held in Glasgow on the 18th inst., Mr. W. F. Salmon, President, in the chair. The Chairman stated that the meeting had been called to consider the following unanimous recommendation of the Council, viz.:—That as the conditions of the Lanarkshire Council competitions are unsatisfactory in the following points, the Institute recommends that members take no part in the competitions:—1. As the competitors are not assured that an architect of experience will be associated with the medical officer to advise the committee in its decision. 2. That no guarantee is given that the author of the design placed first in the order of merit will be employed to carry out the work (provided that inquiries as to his status prove satisfactory). 3. That the terms of employment of the architect selected to carry out the work are not stated. The Chairman further commented on the unsatisfactory nature of the conditions of competition, and reference was made to the memorial which had been largely signed by the profession throughout the country, by which they pledged themselves not to take part in any competition unless a professional assessor was appointed. On the motion of Mr. Campbell Douglas, seconded by Mr. John Honeyman, the recommendation was unanimously adopted.

GLASGOW ARCHITECTURAL ASSOCIATION.—The second lecture of the present session of this Association was delivered in the Rooms on the 15th inst., by the Honorary President, Mr. Wm. Forrest Salmon, F.R.I.B.A., the subject being "The Glasgow Building Regulations

Act." The lecturer, at the outset, briefly referred to the importance of the subject to architects, and noted that perhaps the most important sections of the Act were those affecting the built-upon areas where fencing lands have been laid off in conformity to the Act of 1866. The sections of the Act dealing with background, through openings, &c., were then explained and criticised. The lecturer maintained that, instead of specifying the sizes of through openings, it would be better to have proportioned them to the areas of the hollow squares. The Act might also, with advantage, have embraced the districts round the city, outside its boundaries, to permit of the main thoroughfares leading to the country being widened in view of possible future extensions. Provision might also have been made for widening existing streets within the city as opportunities occurred. At the close the lecturer was awarded a hearty vote of thanks.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—The opening address of the 17th session of the Leeds and Yorkshire Architectural Society was delivered in the Law Institute, Leeds, on the 21st inst., by the President, Mr. G. B. Bulmer, F.R.I.B.A. Having thanked the members for the honour they had done him in electing him as their President, Mr. Bulmer referred to local works in progress, and mentioned with satisfaction the increase in the master-roll from seventy-four in 1882 to 110 in the present year. He next broached an idea which had occurred to him, the amalgamation of the Leeds, York, and Bradford societies, as representing the united county. Sheffield was so far on the border that it might perhaps be taken as the centre of a large district lying to the south of it. Mr. W. Watson, Wakefield, proposed and Mr. J. Holmes Graves seconded a vote of thanks to the President. Six new associates and one honorary member were proposed for election at the next meeting.

EDINBURGH ARCHITECTURAL ASSOCIATION.—At a meeting of this Association on Monday evening last, a lecture, illustrated by limelight views, was given by Mr. G. A. T. Middleton, A.R.I.B.A., on "Architectural Tours in Belgium and Brittany."

BRITISH ARCHEOLOGICAL ASSOCIATION.

At the opening of the session, on the 16th inst., Mr. C. H. Compton in the chair, some interesting discoveries on the site of the old Palace of Bridewell, Blackfriars, were announced by Mr. Loftus Brock. During the progress of works of rebuilding on the site Messrs. Mowlem have laid open the foundations of a long length of the western wall. It is carried on a series of arches of red brick, which spring from abutments of chalk, supported upon massive piles of elm, arranged in groups of twelve beneath each pier.

The Chairman exhibited a fine Gothic key, one of three, need to open the ancient chest in St. Creake Church. Mr. Langdon described the remarkable inscribed stone of granite which he has discovered in Lewannick Church, Cornwall. It has an inscription in Latin, and this is repeated in Ogam characters, this being the only known example in the county. Pre-historic bronze implements, and the matrix of the ancient seal of Kelso Abbey, recently found in Caermarthenhire, were exhibited by Mrs. Lawrence, of Middleton Hall, and Mr. Griffith, of Bangor, the respective owners.

A paper was then read on the "Early Christian Monuments of Glamorganshire," by Mr. J. Romilly Allen, F.S.A. (Scot.). These appear to date from Roman times to the period of the Norman Conquest, those dating from A.D. 700 to 1,000 being covered with interlaced and other patterns. Full-sized rubbings were exhibited, and also a complete series of photographs taken by Mr. Mansel Franklen, of St. Hillary. Papers were then read by Dr. Fryer upon the discovery of the site of an ancient chapel at Horrabridge, Devon, and on a celt which has been found at Swansea.

A NEW STONE-BREAKING MACHINE.—Messrs. S. Mason & Co., of Leicester, have introduced a new form of stone-breaking machine which works on the toggle principle. It is designed for working either on granite and other hard stones or on softer stones, the machine being made suitable for either purpose by an adjustment of the lever which actuates the toggle. The advantages claimed for this arrangement are that no foundations are required (owing to the steady working of the machine) and greater durability.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

THIS Society visited last week the printing works of the proprietors of *Black and White* and of Messrs. Cassell & Co. The members at the former place were accompanied by two gentlemen of the staff end Mr. Herbert Coward, the company's consulting engineer, who explained in detail the whole of the process of printing a first-class illustrated paper, commencing at the "composing-room" and finishing with the folding and stitching. Those members who were not acquainted with the modern processes of printing were much interested in tracing the formation of stereotypes. Great care and trouble has been taken in the selection of the printing and other machines; the former, the visitors regretted to find, were of German design and make, the regret being caused by the fact that these machines were selected solely because their owners believed them to be superior to machines of English make. The folding-machine places on the cover, and folds 2,600 copies per hour. The party then proceeded to the works of Messrs. Cassell & Co., at Belle Sauvage-yard, where they were received by Mr. Hedger, and were by him conducted over this large establishment. These works are of modern construction, and are excellently arranged. The members of the Society commenced their inspection at the ground floor, and were at once taken to the power printing-machines, of which there are thirty-eight on this floor. The machines are of various types and makes, to suit the varied character of the work turned out by the firm. The small power and hand-machines were seen on the upper floors. In the basement were seen the lithographing and calendaring machines, together with the ingenious arrangement adopted both here and at the *Black and White* works for wetting the paper before it is operated on in the printing-room. The large store of paper of all kinds was next inspected, and from this the party was taken through the various floors to the stereotype department (having pointed out to them on their way there various galleys, machines, folding-machines, and hydraulic presses, many of them of unusual size and power), in which were very excellent and cleverly-designed machines for planing and trimming the stereotypes.

THE SANITARY INSPECTORS' ASSOCIATION.

On Saturday, the 12th inst., the ninth session of this Association was inaugurated in an address delivered at Carpenters' Hall, London-wall, by the Chairman of the Council, Mr. Hugh Alexander (Shoreditch), now elected for the sixth year in succession. In the opening portion of the address, besides allusions to the succession of Dr. Richardson to the late Sir Edwin Chadwick as President of the Association, and to the incorporation of the Association under the license of the Board of Trade, several other matters were referred to, among them being the gift of 3,500*l.* in furtherance of the objects of the Association, under the will of the late Mr. Berridge; the invitation by the Société Française d'Hygiène to visit Paris; the change of title from "Inspectors of Nuisances" to that of "Sanitary Inspectors" in Acts of Parliament; and the fusion and affiliation of all the provincial organisations in England as branches of the Association. Among the improvements that still remained to be effected were the reinstatement of the name of the Sanitary Inspector in the London Public Health Act (1891) in the place it occupied beside that of the Medical Officer of Health in the Bill as it stood when originally laid before Parliament; to secure for local authorities the right to base proceedings on the preliminary notices of their inspectors; to obtain the extension to the whole kingdom of the principle, adopted for London in the Act of 1891, that after 1895, candidates for the position of sanitary inspector shall hold certificates of competency; and to obtain the prescription of a minimum salary for sanitary inspectors. Taking advantage of the absence in London of any regulations compelling builders of houses to have proper drains, water-closets, dust-bins, a minimum height of 7 ft. for the ceilings of rooms, abundant light and breathing-space, continuous water supply, &c., the necessities, in short, of respectable family life,—regulations commonly enforced in provincial districts,—the speculating builder, the ignorant architect, and the rapacious landlord bad in many districts of London,—in the aristocratic West-end as well as in the labouring East,—combined for the wholesale creation of buildings in which the necessary health conditions were conspicuously absent. The Mansion House Council had done good service in obtaining from

the Home Secretary an order for inquiry into the condition of the Parish of St. Leonard, Shorehitch, and the report of that Commission had severely condemned the state of things existing in what were called "Model Blocks" of dwellings, built on the flat system. That report concluded thus:—

"To say that some of these model blocks are built without due regard to sanitary requirements would be a misuse of language. The fact is that they are built in gross violation of the very first principles of sanitation. We may draw attention to some blocks of dwellings on the Vinegar-ground, Shorehitch, which illustrate our meaning in a most striking manner. Here will be found buildings on the flat system over 40 ft. high, and less than 20 ft. apart, containing large numbers of separate tenements, approached by dark corridors. The water-closets for these dwellings abut on the corridors, and are without direct light or proper ventilation. The dwellings thus approached contain rooms, many of which can never be penetrated by the rays of the sun. These dark, gloomy habitations are, in our opinion, far more likely to become a source of danger to the public health than are even the worst of the dilapidated cottages to which public attention has been drawn by the Mansion House Council."

After the lapse of nearly two years since that report was presented to Parliament, nothing had yet been done to prevent the further erection of such houses. The history of the Vinegar-ground property showed that the creation of ground-rents had been the point of primary importance in the construction of the houses. Nineteen years ago this site had been cleared of a congeries of rotten and dilapidated houses, light had been let in, and air once more freely circulated over the open land. That was at the time justly regarded as an excellent piece of work, but the horror had reappeared in the form of a large number of dwellings piled up on the top one of another. Nothing could more effectively show that a ground landlord, a wrong-headed architect, and a reckless speculating builder could with impunity build "in gross violation of the very first principles of sanitation," for there was no law to prevent it. In the absence of legislation, it was perhaps futile to reproach the ground-landlord or the building-owner; for if the law did not restrain them, who could? But there was one functionary, the professional architect, upon whom influence might perhaps be brought to bear. Society had claims upon professional men, and it was time that they should be spoken to very plainly, not only in the interest of the public health, but also in that of the noble profession of architecture; and as it could be proved that some of the very worst of these so-called models had been planned by men who write R.I.B.A. after their names, it was high time that the Royal Institute of British Architects should institute an inquiry, and take steps to remove from its roll of membership individuals who, either wilfully or ignorantly, planned buildings "in violation of the very first principles of sanitation." He thought the attention of the London County Council, too, should be called to the evil, and he suggested that it should be empowered to prohibit the erection of dwellings, the plans of which evinced ignorance, on the part of the architect, of the principles of sanitation. If such plans were returned without explanation, it would probably beget on the part of some architects a study of things more important than the preparation of showy pictures of elevations, by which they so often succeeded in palming off the grossest defects in planning.

A discussion followed, on the proposal of a vote of thanks for the address, in which Mr. Tidman, C.E., Messrs. Grigg (Fulham), West (Waltham-stow), Grant (Chelsea), Deo (Westminster), &c., took part. Nearly all the speakers confirmed from their own experiences the evidence adduced in the paper of insubstantial "Model Blocks," and approved of the suggestion to call the attention of the Royal Institute of British Architects and the London County Council to the matter. Mr. West urged in reference to the Sanitary Institute. Mr. Grant said the Sanitary Institute had undergone a great transformation, and he hoped overtures would be made to bring about more cordial relations between the two bodies of sanitarians. Mr. Alexander responded to the vote of thanks, which had been cordially and unanimously agreed to, and indicated his acceptance of the suggestions for the emendation of his address. After some formal business, the meeting closed.

THE ENGLISH IRON TRADE.—The English iron market is again quieter, and the recent spurt in Cleveland pig-iron has speedily fallen away, prices reverting to their old level. In Scotch makers' iron quotations are also weaker. Manufactured iron is still in poor inquiry, but in one or two instances their recent firmness in tone, and makers are doing, and rails have fallen in value. Shipbuilders are only fitfully engaged. The coal trade is fairly steady.—*Iron.*

TRADE CATALOGUES.

Messrs. Longden & Co., of Sheffield and London, send us their new illustrated catalogue of grates, fenders, &c. The catalogue is compact and well got-up, and the illustrations, though small, are faithful representations of the goods, having been reproduced from photographs. There is a clear and concise description, with price, of each article illustrated. What is more gratifying, and what we certainly do not find in every catalogue of the kind, is that the majority of the articles are of really good design. The things we like least are the stair balusters, and the attempt to treat colicases in a decorative manner is not more successful here than in most other cases we have seen. But the wrought-iron grates of various types form an exceedingly creditable set of designs, and there is nothing that is in bad taste among them.

Mr. H. A. Hobday, of Chatham, sends us the fifth edition of his small but very useful illustrated price-list of tools and workshop appliances for carpenters and other workmen in the building trade.

Messrs. W. H. Spencer & Co., of Hitchin, Herts., send us an illustrated catalogue of pumps and pumping-machinery of all kinds, steam-engines, boilers, &c.

Correspondence.

To the Editor of THE BUILDER.

"ARCHITECTURE A PROFESSION OR AN ART."

SIR,—In reply to my question whether anyone would seriously propose an examination for literature, Mr. White writes that an examination for literature has existed from time immemorial, namely, that *in literis humanioribus*.

Saiding aside the antiquity of this examination, which at Oxford is, I believe, barely ninety years old, I reply to Mr. White that it is not an examination for literature at all, and has nothing to do with my argument. It is an examination in literature, a very different thing,—and that only in the literature of Greece and Rome.

My point was that it would be as sensible to make a man pass an examination before you allowed him to become an author as it is to apply a similar test before you let him become a designer of buildings. And, further, that it is as vain and misleading to dub a man architect because he has read about architecture in books and answered certain questions on paper, as it would be to call him a literary man because he has not been plucked in the schools.

You, Sir, I am sure would not engage as a writer on your staff any young man who could show a "Testamur" in the school of Litt. Hum. unless you know from experience that he had the natural gifts and the acquired skill necessary to an author; and similarly no sane person would employ a young architect simply because he could put five letters after his name, but could give no evidence of his capacity for designing buildings.

Mr. White traces an analogy where none exists. His mistake is natural enough in an advocate for the Architectural Examinations, because they rest principally upon a false analogy; and it is not only natural, but, from our point of view, instructive, that he should have fallen into it.

THOS. G. JACKSON.

THE PANTHEON.

SIR,—With reference to your interesting article on the recent evidence as to the date of the Pantheon, it would be interesting to know the exact positions at which the dated tiles were found. I write without access to books of reference, but I am under the impression that Michelangelo is stated, in Murray's "Handbook to Rome," to have held the opinion that the upper part of the Pantheon was later than the lower part, and was of the time of Hadrian. Fergusson, in his Handbook, puts the work as still later.*

CHARLES J. FERGUSON.

SIR,—The interesting discovery of M. Chedanne as to the date of the building, and suggestions thereon given by you in the last issue of the *Builder*,

* See our "Note" on p. 412.

leads me to make the following notes and remarks which may be of use.

I think it is generally believed that the bronze doors, as now *in situ*, have not been disturbed since the date of their erection in the edifice. No one of these doors rest upon a threshold block which is a monolith of rich African marble, 2 ft. 3 in. broad, extending the entire width of the opening and beyond under the bronze plasters of the sides. It is nowhere cracked, but much worn so must be of considerable thickness.

This special marble was certainly not known in the Augustan age, nor do I call to mind its being used before Trojan or Hadrian's date. If so, the doorway may not be earlier than Hadrian's time.

The two interior marbles, the numidicum (*Numidicum*) and synnadicum (*Synnadicum*), used for the columns and pilasters, undoubtedly were two of the earliest coloured marbles used in Rome. The Porphyry was somewhat later. The circular slabs of the latter material used in the pavement are about 9 ft. across. It would be interesting to know whence they came and their date. It may be that they are the missing drums of the Constantinian column at Constantinople brought back to Rome, and cut up into roundels at a later date.

As regards the portico, seven of the front columns are from a site in the Arabian Desert or Egypt, "Mons Claudianus," some seventy miles from the Nile. Now, these quarries were certainly not worked before Roman times, and it is very doubtful if they were worked in Agrippa's time. The transport of them must have been a far more stupendous business than that of the red ones from Syene, which quarries were near the Nile. If this portico is really Agrippa's, it may be that originally the columns were built with drums of white Pentelic marble, the same as that used for the respond fluted pilasters, each of which are in fact four stones with fine jointing (like the Jupiter Olympus columns at Athens). They have some what the appearance of being refixed, but I could not decide if they were or not lime-putty bedded. The carving of the capitals does not help us much, the portico and interior both being good; but the former is, I think, the best.

W. BRINDLEY.

THE ST. PANCRAS VESTRY COMPETITION.

SIR,—The St. Pancras Vestry mean evidently to make a good bargain for themselves over the competition for their proposed municipal buildings. The first premium is to be only 100 guineas if the author of the best design does not get the job, and only the bare 5 per cent. on the cost if he does, involving the forfeit of his premium and of his working drawings at the completion of the building. The 25 guineas for the third premium is little in all conscience, but in stipulating that all premiated designs shall become the property of the Vestry, the author of the third premiated design will therefore receive this pittance in payment for the complete plans of a building to cost 50,000l., which plans must, on their intrinsic merits, be quite good enough to be carried out.

It can hardly be that the Vestry have acted upon the advice of an architect of position, so far, in dividing up such conditions for a competition which allow of the promoters reaping a harvest of ideas from the profession for a total of 75 guineas.

"TOO OLD A BIRD," &c.

THE PAINTINGS AT MARLBOROUGH HOUSE.

SIR,—You state in "Notes," in the current *Builder*, that the wall-paintings at Marlborough House were restored by Mr. Richmond, R.A., and the late Mr. Henry Merritt. This is inaccurate; my father had nothing to do with the restoration of these reputed works of Daguerre.

JOHN RICHMOND.

CERTIFICATE OF THE SANITARY INSTITUTE.

SIR,—I quite agree with the letter in last week's edition from your correspondent "G. S. L." It is high time a note of warning was given to the Sanitary Institute in regard to the class that they are certifying as Sanitary Inspectors, a very great proportion of whom are entirely incompetent to carry out the duties of a Sanitary Inspector through the lack of either any technical knowledge or training. A large number of certificates are obtained simply by a few months' or even weeks' cramming from text-books, assisted, perhaps, by the help of a professional coach, things all very well, doubtless, in their way, but which alone will never make a really good Inspector. The Sanitary Institute must, as your correspondent says, and very rightly, too, if its Certificate is to command respect, insist that candidates have a thorough knowledge of the most important thing to make a really efficient Inspector,—that is building construction. I would

* I hope shortly to be able to give notes as to the chronological working of ancient quarries which may be of use to archaeologists, as it is impossible for a building to be older than the first working of a quarry from which the marble came.

take the duties of Food Inspector and Sanitary Inspector into two entirely distinct offices.
AN ASSOC. SAN. INST.

THE SIX CLERKS' INN, CHANCERY-LANE.

SIR,—In your last issue you refer to the site of the Six Clerks' Inn, Chancery-lane. In an old deed mention is made of the inn as under:—

"Grant by John Higgin, S.T.P., of Wolsay's College, Oxford," certain estates, and "A Message in Chancery-lane, in the suburbs of London, lying between the message in the tenure of the Six Clerks on the north and Ballard's-lane on the south, and abutting on the highway called Chancery-lane on the east and the field called Thicketfield on the west, as held by the dean and chapter of the gift of Sir William Weston, prior of St. John's."

Dated in the College Chapel, Oxford, January 15, 1530."

This "grant" was followed by another that gave to the King the "Six Clerks Inn," as under:—

"Grant by Sir William Weston, Prior of St. John's Hospital, to Sir William Poulet, Christopher Hales, Attorney-General, Baldwin Mallett, and Thomas Cromwell, to the King's use, of the manor of Hampton Court, Middlesex, with the advowson of the priory of Bishwbury in Salisbury Cathedral, and a message in the tenure of the Six Clerks on the north, and Ballard's-lane on the south, and abutting on Chancery-lane on the east, and Fyckettsfield to the west.

Hugh Whalley, Ralph Sadglover, and Will Brabazon to enter in the Prior's name and deliver up possession for him.

Dated from Hampton Court, June 5, 1538."

These documents do not agree with the statement at "John Kedmister bought the house in Chancery-lane for the Six Clerks." It is clear that in 1538 the Six Clerks were merely tenants under the Prior of the Hospital of St. John of Jerusalem, that institution having obtained it from the King (who he succeeded the Knights Templars, and gave a large portion of their plundered estate to the Knights of St. John; but that is a long time since, and John Kedmister's alleged gift has no date.

WALTER BLOTT.

STREET CLEANSING.

SIR,—In reference to the remarks in the *Builder* of the 19th inst. as to the sloppy sweepings of the roads being left in the gutters at the street crossings, perhaps the following suggestions may be worth the consideration of our sanitary authorities.

My scheme is, that small covered cesspits be formed under the channels at suitable distances, tied with strong gratings and close covers, that the slops be swept into them, and at convenient times the slops be pumped up into the vans or carts. This would entirely get rid of sloppy gutters, and the objectionable and slow process of tidying up as now done. The initial cost would be so trifling that it would soon be saved in the amount of filling the carts, and the comfort to pedestrians would be worth much.

G. H. LUTCHFORD.

A PLEA FOR THE COAL FIRE.

SIR,—Already one seems to hear the clink of the cooling embers of the last coal fire. Its death will be a very human one.

A coal fire is more than cheery, it is sympathetic; or its life, with its dark days and bright days, its moments of steady glow and fitful flicker, is like our own. It animates the shadows it casts on our walls; fancy makes them figures of our past; and each glint of light it scatters around us we see a beam of a future that we may hope for. And in its self-consuming desire to rise above itself there is all type of the yearning of every true man's heart.

To sit through a long evening with a coal fire is to sit in the company of a living thing. Contrastively, to sit with a gas stove is to sit in the company of a corpse.

R. L.

CHANCEL-SCREEN, WEST PELTON CHURCH, DURHAM.—A carved oak chancel-screen has just been erected in West Pelton Church, Durham. The screen is constructed of wainscot oak, unadorned. It is 15 ft. 3 in. high, and about 20 ft. wide, and consists of three bays, the two sides being divided into four, having their upper parts filled with open tracery in the form of the fleur-de-lis, the intervening uprights being enriched with red pinnacles with crocketed finials. Above is a moulded cornice with a wide pierced hand-vine leaves and fruit, and over this is a deep resting of open tracery, leaves, and flowers. The lower panels are filled in solid with carved tracery, still retaining the idea of the fleur-de-lis form. The work has been executed at a cost of about 200l. from the designs of Mr. A. Crawford Hick, of the firm of Johnson & Crawford Hick, architects, Newcastle.

The Student's Column.

CONCRETE.—XXII.
FOUNDATIONS.

RECEIPT in those districts where there is an abundant supply of rag-stone footings, concrete is universally used in England for foundations, perhaps alone, or in conjunction with piles, steel rails, &c. The regulations of the London County Council respecting foundations are as follows:—

"The foundations of the walls of every house or building shall be formed of a bed of good concrete, not less than nine inches thick, and projecting at least four inches on each side of the lowest course of footings of such walls. If the site be upon a natural bed of gravel, concrete may be omitted from the foundations of the walls with the approval of the District Surveyor. The concrete must be composed of clean gravel, broken hard brick, properly burnt ballast, or other hard material to be approved by the District Surveyor, well mixed with freshly-burned lime or cement in the proportions of one of lime to six, and one of cement to eight of the other material."

These regulations are open to several grave objections. In the first place, it is matter for surprise that, while the thickness of walls is carefully defined according to their height, length, &c., the thickness of the foundations, on which the stability of the walls primarily depends, is not prescribed more particularly than "not less than 9 in. thick." Then, again, why should it be necessary to use brick footings at all, when we know that Portland cement concrete (1 to 5) is nearly four times as strong as brickwork set in cement mortar (1 to 1)? The thickness of the concrete might be increased, and the wall might be built upon it without any brick footings, and a saving in the total thickness of the foundations might thus be effected without loss of strength. Nothing is said as to whether the sand and coarse material are to be measured separately or not, and this, as we have shown, is a matter greatly affecting the strength of concrete. And lastly, concrete may be of nearly any kind of lime, however feebly hydraulic, in the proportion of 1 lime to 6 aggregate, while, if the very best Portland cement be used, no more than eight parts of aggregate can be mixed with it, and yet the latter might be eight or ten times the strength of the former. Surely the framers of these regulations could not have known the results of Mr. Grant's experiments on the strength of various kinds of concrete.† Altogether he made 350 6-in. cubes of concrete having varying proportions (by volume) of lime or cement and aggregate; the aggregate in each case consisted of gravel and sand (apparently mixed together just as obtained from the pit or river), weighing 137 lbs. per bushel; ten blocks were made of each kind, were kept in air, and crushed at the end of twelve months. Table XXIV. has been calculated and framed from Mr. Grant's figures.‡

Mr. Bernays, at Chatham Dockyard, found that 1 to 12 Portland-cement concrete cost the same as 1 to 6 lias-lime concrete, and was stronger and more uniform. There is no doubt that the regulations of the London County Council favour the use of inferior matrices in concrete.

The average ratios of strength deduced from Mr. Grant's tests show that 1 to 8 concrete is about three-fourths the strength, 1 to 10 about one-half the strength, and 1 to 12 about one-third the strength of 1 to 6 concrete. These are the average ratios; individual cases are sometimes very different from these; for instance, grey-lime concrete (1 to 8) appears weaker than 1 to 10), the lias-lime concrete No. 3 gives practically equal results with the three different proportions, and the Portland-cement concrete No. 11 has less strength when 1 to 6 than when 1 to 8. But we must look on these instances as abnormal. It may be confessed, however, that the *lime*-concretes, namely, Nos. 1, 3, and 5,—differ most widely from the average ratios. And this is one of the disadvantages of *lime*-concrete; one is never as sure of its behaviour as of that of Portland cement.

The foundation of a wall, as required by the regulations of the London County Council, is

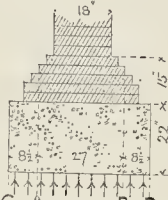


Figure 4.

shown in fig. 4. Fig. 5 shows two forms of concrete foundation, in which the brick footings are replaced by concrete, having approximately the same shape as the brickwork. The slopes

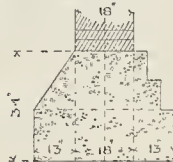


Figure 5.

and set-offs would have to be formed with boards roughly fixed in position, and removed when the concrete had set.

The minimum thickness of concrete founda-

TABLE XXIV.

Compressive Strength of Concrete in Tons per Square Foot.

No.	Limes and Cements.	Weight per Bushel.	Proportion of Lime or Cement to Gravel and Sand.			
			1 to 6	1 to 8	1 to 10	1 to 12
		lbs.	Tons.	Tons.	Tons.	Tons.
1	Grey lime	10.2	18.5	4.6	5.2	.....
2	Grey lias Selenitic	11.4	11.1	8.1	.....	.....
3	Lias lime	17.2	19.6	10.2	.....	.....
4	Lias lime	23.0	10.7	8.5	.....	.....
5	Selenitic lime	26.6	15.3	13.5	.....	.....
6	Selenitic Rugby lias	37.1	34.2	21.1	.....	.....
7	Selenitic Rugby lias	34.1	21.8	15.4	.....	.....
8	Selenitic Aberthaw lias	74	17.2	10.7	5.8	.....
9	Rugby lias Cement	114	100.7	76.4	53.5	37.1
10	Port and Cement	120	86.4	91.7	52.2	29.1
11	Portland Cement					

If we compare the 1 to 6 lime-concretes with the 1 to 8 cement-concretes, we find that the best lias-lime concrete tested by Mr. Grant (No. 5) is less than one-third the strength of the worse Portland-cement concrete, and only one-fourth the strength of the better. Portland-cement concrete (1 to 12) is shown to be better than the best lias-lime concrete (1 to 6).

* John Grant.
† Proceedings, Inst. C.E., Vol. LXII. (1878-80), part IV.
‡ For the tensile strength of the same limes and cements see table II., p. 56, ante.

tions is specified by the London County Council to be 9 in., but nothing whatever is said as to any additional thickness which may be required for heavier walls. The concrete under some of the walls of Street's Law Courts was 7 ft. thick, and that under the walls of the great hall there was 10 ft. thick; but apparently the London County Council, although it regulates the thickness of walls, thinks the thickness of foundations quite a trivial matter. Certainly the subject is one which has received little or no attention from writers. Architects are content to guess at the thickness required.

Undoubtedly the subject is fraught with difficulties, as in every case there are "unknown quantities" which give an element of uncertainty to the calculations. Perhaps, however, a few words will show that the thickness (within reasonable limits) of concrete foundations is calculable.

Bearing Power of Grounds.—The first "unknown quantity" with which we have to deal is the bearing power of the ground itself. This, of course, may vary from nearly zero for bog to several hundred tons per square foot for solid granite. In founding on bogs or very soft ground piles or caissons of concrete or some other contrivance must be adopted. But on ordinary ground concrete itself is sufficient. The safe bearing power of various kinds of ground is, roughly, as follows, in cwt. per square foot:—Alluvial soil or quicksand, 10 to 15; soft clay (near surface), 10 to 15; moist clay, 20 to 30; compact clay, nearly dry, 40 to 50; dry compact clay of considerable thickness, 60 to 100; loose sand, 20 to 30; compact sand, 40 to 60; ditto, prevented from spreading, 100 to 150; gravel and sand, 40 to 60; ditto, compact dry and prevented from spreading, 80 to 120. The bearing power of most solid rocks is far in excess of any weight which in ordinary buildings can be put upon them, but great care must be exercised on rocky sites in bridging over soft dykes or fissures with concrete, as otherwise unequal settling must occur. But of this, more anon.

Nature of Stress.—It is often thought that the stress which is put upon foundations is simply a compressive one, but this is not the case. There is more or less of a transverse stress, caused by the weight of the wall acting upon the central portion of the foundation and tending to crack it longitudinally. To minimise this stress, the lower portion of the wall is spread out gradually almost to the breadth of the foundation proper. But the amount of the transverse stress varies according to the supporting power of the ground and the width of the foundation (the latter, however, being modified by the spread of the lower part of the wall). If the concrete be laid on solid rock, there is no transverse stress; in such a position, concrete is not needed, for the chief office of concrete is to distribute the weight of the wall over such an area of ground that little or no settlement may occur. The firmer the ground the less may the width and thickness of the concrete be.

Calculation of thickness, &c.—Let us assume that the total weight of the wall, floors, and roof acting upon the foundation shown in fig. 4 is 110 cwt. per lineal foot, and that the ground is moist clay with a safe bearing-power of about 30 cwt. per square foot. If we divide 110 by 30 we find the necessary width of the foundation to be 4 in., as shown. Required the thickness.

The second "unknown quantity" now thrusts itself upon our notice: to what extent is the weight of the wall distributed by the brick footings? Probably the outermost half-brick at each side bears little or none of the weight, but so much depends on the bricks, the bond, and the mortar that no definite rule can be laid down. Assuming such, however, to be true in this case, we have the weight of the wall, &c., distributed over the central 27 in. of the concrete, as shown at A B.

As action is equal and opposite to reaction, the upward thrust of the ground, shown by the arrows under the concrete, is as the weight upon it,—namely, 30 cwt. per square foot. The concrete between A and B will be subject to simple compressive stress, but the parts AC and BD are inverted cantilevers, uniformly loaded, and fixed at A and B respectively. Perhaps the calculations will be more easily followed if the figure be turned upside down. Formula VII. in the preceding chapter gives the breaking weight of uniformly-loaded cantilevers:— $W = \frac{1}{3} C \frac{BD^2}{L}$. Transposing this, we get:— $D = \sqrt{\frac{3WL}{CB}}$.

In the example before us, $L = 8.5$ in., $B = 12$ in., $W = \frac{8.5}{12} \times 30 = 21.25$ cwt., and $C = 1.5$ for concrete composed of 1 Portland cement, 2 sand, and 6 broken stone.* Substituting these values for the letters on the right side of the equation, we get:— $D = \sqrt{\frac{3 \times 21.25 \times 8.5}{1.5 \times 12}} = \sqrt{30.1} = 5.5$ in.

* No 12, Table XXIII, chap. xxi.

This is a thickness at which fracture would just occur. It must be multiplied by a factor of safety, which for ordinary foundations may be taken at 4. The safe thickness of the concrete will, therefore, be 22 in.

If the brick footings were omitted, the length of each cantilever would be 13 in., and W would be 32.5 cwt. Then we should have—

$$D = \sqrt{\frac{3 \times 32.5 \times 13}{1.5 \times 12}} = \sqrt{70.4} = 8.4 \text{ in. Multiplying by 4, as before, we find the safe thickness to be nearly 34 in., as shown in fig. 5, i.e., 3 in. less than the concrete and brick footings shown in fig. 4.}$$

The sides of the concrete could be sloped or stepped, as in fig. 5, without in any way detracting from its strength. Certainly the foundation entirely of concrete would be more economical than that of concrete and brick, strength for strength. The London County Council regulations, however, insist on the brick footings, although in many cases, owing to bad bond, soft bricks, and mud-like mortar, the brick footings are of extremely doubtful service.

OBITUARY.

MR. JAMES WILLIAMS, F.R.I.B.A. — The R.I.B.A. Journal announces the death, on the 9th inst., of Mr. James Williams, who will be remembered chiefly in connexion with many of the Post-offices erected in this country. Born January 20, 1824, he entered H.M. Office of Works at the age of twenty-four. In 1853, he was appointed Surveyor for the erection of Post-offices. Among the numerous buildings erected under his supervision may be mentioned the Post-offices at Manchester, Hull, Nottingham, Newcastle, Sheffield, and Bristol; in London the G.P.O. West, the Post-office in Bedford-street, and the Savings Bank, Queen Victoria-street.

MR. J. GOLDIETT TURNER, F.R.I.B.A. — Mr. Goldieutt Turner, whose death occurred on the 12th inst. in his fifty-first year, was (according to the R.I.B.A. Journal) articled to his father, the late Mr. John Turner. For two years he was an assistant to the late Sir Horace Jones, and in 1864 became a partner with his father. For several years he served on the Council of the Architects' Benevolent Society, and in 1876 he succeeded his father as Hon. Secretary, resigning his official duties in 1880.

GENERAL BUILDING NEWS.

THE QUEEN ELEANOR MONUMENT, WALTHAM CROSS. — Through the exertions of the Secretary of the Restoration Committee, Mr. J. Tydeman, the restoration of this ancient monument has now been completed. The work was commenced about four years ago, under the supervision of Mr. C. E. Ponting, F.S.A., the work being executed by Mr. Harry Hems, of Exeter; but by reason of the exhaustion of the funds, it was not possible at the time to complete the work. By the liberality and kindness of the local gentry, aided by the Local Board, the necessary funds have now been raised. In no case, we are told, has the ancient work been interfered with, and the original lines of the steps and benches, so far as it was possible to do so, have been strictly followed. The raising of wrought-iron is of late thirteenth-century character. The lower part of the rail is from the tomb of Edward I., now destroyed, and the upper part from that of Queen Eleanor, still in Westminster Abbey. The masonry work has been carried out by Mr. Hanchet, of Waltham Abbey, and the railing by Messrs. Starkie Gardner, & Co., under the supervision of the Engineer to the Local Board, Mr. Thos. Bennett, Assoc. M. Inst. C.E.

St. MARTIN'S PUBLIC BATHS. — The Public Baths and Wash-houses in Orange-street, Leicester-square, belonging to the Parish of St. Martin-in-the-Fields, were reopened on the 14th inst., having been closed for three months for extensive repairs. These are the oldest public baths in London, having been erected in the year 1847, accommodation being provided for seventeen first-class male, five first-class female, twenty-second-class male, and twelve second-class female bathers. There is also on the first floor accommodation for sixty persons in the public laundry, besides the usual attendants' rooms, offices, and stores. The repairs consisted in repointing the elevations and stone work. New baths have been provided where required, and the whole fitted with new tank tops and framings, the second-class fittings being in sycamore. New slate floors and partitions have been provided, and an entire system of drainage on modern principles. The three horizontal boilers, with circulating pipes, and the main bath wastes, have been repaired and cleaned and put in thorough working order, and additional means of ventilation have been provided. The contractors for the general builder's work were Messrs. McLachlan & Sons, Duke-street, Adelphi; for the engineers and fitters' work, Mr. David Annan, of Vulcan Iron Works, Bow; for the ventilation, Messrs. Ashwell

& Co., John-street, Adelphi; and for the sanitary fittings, Messrs. Geo. Jennings, Lambeth. The cost of the whole of the work has been 2,750l. It has been carried out under the immediate superintendence of Mr. Chas. Mason, A.R.I.B.A., To Hall, Charing Cross, Surveyor to the Commissioners.

ADDITIONS TO MARLBOROUGH COLLEGE. — We are informed that Messrs. Stephens, Bastow, & Co. Limited, of Montpellier, Bristol, have been entrusted with the erection of additions to the Marlborough College, at a cost of 12,600l. Messrs. Bodley Garner, of London, are the architects.

REFUGE AND SHELTER FOR WOMEN. — This building, which was formerly used for public baths at washhouses belonging to the Liverpool Corporation, was purchased by Father Nugent, with the view of adapting it to its present purpose. The building was opened on the 14th inst. by Lady Howard Glossop. The basement contains a spacious dining room, kitchen, pantries, &c. On the ground floor are night and day rooms, baths, and lavatories. On the first floor is the large dormitory, 117 ft. long by 17 ft. wide, infirmary, chapel, lavatories, and bedrooms. There is also on the ground floor an independent building 73 ft. long by 14 ft. wide, which will be used as a washhouse, to which is attached drying-rooms, two large ironing-rooms, an boiler and engine house, for it is proposed to do the laundry work by machinery. Over this washhouse is a flat roof which is intended to be used as an open-air promenade. The additions and alterations have been designed by Messrs. Ware & Rathbone, architects, Liverpool, and the work has been executed by Mr. G. C. Beecham, contractor, at a total cost of about 4,000l.

BOARD SCHOOL, SMALL HEATH, BIRMINGHAM. — On the 7th inst. the Waterley-road Seventh Standard Board School, Small Heath, Birmingham, was opened by the Right Hon. A. H. D. Acland M.P. The school provides accommodation for 300 boys and 300 girls. The building has been erected on a site lying between the Waterley-road and the Byron-road, Small Heath. The school is a one-story building, and is arranged with a central assembly-hall surrounded by class-rooms, work-rooms, and laboratories. The assembly-hall is 68 ft. by 30 ft. There are four entrances to the building,—two for boys, and two for girls. The boys' division faces the Byron-road, and the girls' the Waterley-road. The entrances for each sex are connected by a long corridor running parallel to the roads which give access to the assembly-hall and the various class-rooms, laboratories, and work-rooms, as well as to the school of cookery. Adjoining each entrance is a lavatory and cloak-room over which are the rooms for master and mistress.

In the girls' division there are five class-rooms, giving accommodation for forty-eight in each, and a cookery school with accommodation for sixty. In the boys' department there are six similar class-rooms, each for forty-eight boys, a chemical laboratory 60 ft. by 30 ft., a workshop of the same size with a store for timber, a lecture theatre capable of seating about 100 children, with a preparation room adjoining. Between the preparation room and the laboratory are arranged a balance-room, combustion store, and apparatus store. On the first floor over the room is provided for preparing diagrams for lecturing purposes. The chemical laboratory is fitted up with six work-benches placed down the centre of the room, accommodating in all forty-eight boys. The assembly-hall is fitted with cases for physical apparatus, so that it may be used as a physical laboratory. The workshop is divided into two parts, being fitted for carpenter's work, and the other for smith's work. The tower is made so as to ensure ventilation and the extraction of fumes from the work-benches. The architects are Messrs. Martin and Chamberlain, and the builder, Mr. T. Rowbotham.

NEW PUBLIC BUILDINGS, BODMIN (CORNWALL). — The public buildings at Bodmin, the assize and county town of Cornwall, which have been recently erected from the designs of Messrs. Octavius Railing & Lewis Tomar, architects, of Exeter (whose plans were accepted from seventeen sets sent in by architects of Devon and Cornwall), were opened on the 25th ult. The formal ceremony was performed by the Hon. Misses Agar-Robartes, to whom silver keys were respectively presented by the architects and the contractor, Mr. Sampson Treloar, of Launceston. The principal feature of the new building is a hall, 80 ft. long by 40 ft. wide. In the entrance lobby is laid a tessellated pavement, the gift of Mr. Henry Dennis, New Hall, Ruabon, North Wales. On either side of the vestibule are cloak-rooms. The large hall has an open-timbered wagon roof. Internally the walls are stuccoed above a high panelling dado of pitch-pine, with an ornamented border. It is well lighted by nine lofty windows of three lights each, filled with cathedral glass. The flooring is of pitch-pine, specially adapted for dancing. At the northern end of the hall is a commodious platform stage, with dressing-rooms at the back. The hall will seat about 800 people. On the first floor, over the space occupied by the lobby and vestibule, at the Fryar end, is a small hall, 35 ft. by 20 ft., having an external stone stairway from the west side and an internal staircase from the vestibule, so that it may be used either separately or in con-

nection with the main hall. Its principal feature is an oriel window, which has been erected in the gable end, as the gift of Miss Hichens, of St. Nicholas, in memory of her mother, who was for many years a magistrate and a friend of Bodmin. In digging the foundations, the remains of the ancient Franciscan Friary, which formerly occupied the site were found, perhaps the most complete and certainly the best preserved was a respond which has been re-erected the vestibule as a pillar dividing the two doors, which open into the main hall. A buttress of the old ruined church has been re-erected on its original site at the north-west angle of the modern building, while one of its pillars now forms the support of the chimney-stack, and other interesting relics have been incorporated in the new public works.

CHURCH ROOM, FARNCOMBE, GODALMING.—On the 24th ult. the Bishop of Winchester opened the church room which has been erected from the gift of Mr. Chas. Forster Hayward, F.S.A. architect. It comprises, besides the room itself, covering a space of 45 ft. by 26 ft. 6 in., fitted with platform, a large room, 27 ft. by 16 ft., as a classroom or retiring-room, and is fitted with range, sinks, &c., to make it specially suitable for cookery classes. The builders were Messrs. Mitchell Bees, of Shaftford, and the heating apparatus was supplied and fixed by Messrs. Rosse & Russell, of Charing Cross. Special attention has been paid to ventilation by small inlet flues in the walls, and "Mezies" ventilator in the roof. Besides this, spare chimneys are used as exits.

CARVING, CORNHILL AND SANDRINGHAM.—Mr. Albert Seale, of George street, Cambridge, writes of the carving at the new Bank in Cornhill, and in the additions to Sandringham House both described in our last, was executed by him.

FOREIGN AND COLONIAL.

FRANCE.—The Minister of Commerce has just authorized the minister of Fine Arts to proceed for the purpose of organizing the project for the exhibition to be held in 1900 to a preparatory Commission. This Commission is divided into three sub-committees. The first is to consider the site of the exhibition, and the necessary means of transport; the second will see after the general grouping and the classification of the exhibits; and the third will undertake the finance. It is most probable that the exhibition will not be held in the Champ de Mars, and the choice will lie between the plateau of Courbevoie and that part of the Bois de Boulogne which is nearest to Bagatelle. The latter, from being near the Seine, is likely to be the most favourable spot. The Senate has just authorized M. Baridon, late Minister of Fine Arts, to send in a report on the project of rebuilding the Opéra. The work of strengthening the rocks which support the "Temple de la Sybille," and also the brick bridge which leads to it, will shortly be commenced; the temple is in the Buttes Chaumont. The Académie des Beaux-Arts will assist in a few days at the election of a painter to replace the late M. Sigolot. The candidates are, alphabetically, MM. Benjamin Constant, Joseph Blanc, Carous Daran, Mailart, Olivier Merson.

To-morrow, the 27th inst., the inauguration of the statue to the memory of the poet Théodore de Banville will take place in the Luxembourg Gardens. This monument, which is close to the Medicis Fountain, is composed of a column with a statue on top, and a white marble column surmounted by a bust of the poet. The President of the Republic has just nominated M. de Nolhac Conservateur of the Museum at Versailles, in place of the late M. Charles Gosselet. M. de Nolhac has been connected with the National Museum, and Consulting Master at the Ecole des Hautes Etudes, and is also the author of several works on Renaissance art. The works of the landscape painter, the late Lepine, are on view in the Durand Ruel Galleries, Rue Lafitte, from November 28 to December 17. An exhibition of the works of the landscape-painter, M. Eugène Clary, is now being held in the G. Petit Gallery, Rue Cadot-de-Monroy.

We may mention amongst the exhibitions of impressionist and symbolical pictures which have just been opened, the works of MM. Cheret, Issaro, and Madame Jeanne Jacquemin. By the decision of the Minister of Agriculture, M. Edouard André, architect, has been elected Professor of Architecture of the gardens of the Horticultural School at Versailles. The sculptor, Adrien Guérou, has just gained the first prize in an open competition for the capital of the State of Indiana, U.S.A., for the execution of two large bas-reliefs, which are to be placed on the monument commemorating the War of Secession. The bas-reliefs, which are about 10 metres high and 7 wide, are to represent "Peace" and "War." A monument has just been inaugurated in the St. Lazare Cemetery to the memory of the painter Cahanel. This monument, which is the combined work of the architect, Formigé, and of the sculptor, Merrié, is exhibited at the Champs-Élysées Salon last spring. It represents a woman clothed in a light tunic, standing with a palette in her hand, and a vase on which stands the bust of the artist. There will shortly be an inauguration at

Valence (Drôme) of the statue of the Comte de Montalivet, late Minister of Louis Philippe. A long stone sarcophagus, dating from the early part of the Christian era, has been found in the courtyard of the Caserne Fiolet at Calons-sur-Marne. M. Vietto, Minister of Public Works, has just ordered M. Delebecque, Engineer of Roads and Bridges at Thonon, to survey periodically the glacier of the tête rousse, where the torrent originates, which last July caused such havoc at St. Gervais, and destroyed the établissement there. The death, at the age of sixty-seven, is announced of the painter Louis Heyraud, pupil of Paul Delarocche and Picot. He made a specialité of sporting and hunting pictures. M. Auguste Firajot, painter of portraits and religious subjects, has just died at the age of seventy-six. He was a pupil of Abel de Pujol. We have learnt of the death of M. Louis Lottier, sea-painter. He was a pupil of Guérin, and exhibited at the different Salons from 1829 to 1838. His pictures were principally views in Egypt, Algeria, and Constantinople. The death of M. Armand Pmel is also announced. He was a pupil of MM. Sauvageot and Roulet. The committee which has been formed in the Dauphiné for the erection of a monument to the Chevalier Bayard at Pontcharra, in the Canton of St. Jean, has just elected as the designer of the sculptor, P. Rambaud. He has represented Bayard on horseback, in armour, and pointing with his sword the road to Milanais.

MISCELLANEOUS.

PRIVATE BILLS AND THE SESSION OF 1893.—Amongst the Bills which, as it is announced, will be deposited at the House of Commons Private Bill Office, on or before the 21st of next month, are the two following:—By the Channel Bridge and Railway Company, either alone or in conjunction with the South-Eastern, and London, Chatham and Dover Railways, and other companies, the Dover Harbor Board, &c., to carry on experimental works for ascertaining and determining the practicability of making and maintaining a bridge or viaduct over the English Channel. By the South-Eastern, and London, Chatham, and Dover Companies, for authority for amalgamation, under such name as may be sanctioned by Parliament, either by the dissolution of each company and incorporation of the shareholders into one company, or by dissolving the latter and constituting the shareholders therein as shareholders in the South-Eastern.

ROBERT BOYLE & SON (LIMITED).—The seventh annual general meeting of this company was held at the City Terminus Hotel on the 15th inst., when a dividend of 2 1/2 per cent. was declared, free of income-tax, for the year ending September last, after placing to reserve fund one-sixth of the profits earned, and carrying forward 1,366 l. 4s. 9d. This makes the seventh dividend, 12 1/2 per cent. being paid for the last three years, and 12 per cent. for the previous year. M. Robert Boyle (chairman and managing director), in moving the adoption of the report and accounts, which were unanimously passed, in the course of his remarks, stated that the orders and contracts secured during the year, especially in England, were considerably in excess of those of the previous year, though that was the most profitable year since the formation of the Company. He stated that at present in hand a number of important contracts at home and abroad, including the largest ventilating contract they had ever received from the British Government, and one of equal magnitude for the Spanish Government. Though they had a registered capital of 120,000 l., it had not been found necessary to call it all up, and he did not think that that necessity was ever likely to arise, as their reserve fund, to which a sixth of the profits had been added each year, was now represented by a substantial and solid sum, and was a sure guarantee against all ordinary contingencies. It was anticipated that the dividend for the current year would balance the subscribed capital of the company, including the ordinary shares held by himself, when cent. per cent. would have been paid.

THE GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.—The classes in architecture at this College during the Saturday afternoons in October were engaged sketching and measuring in Glasgow Cathedral. During the present month in conjunction with the Building Construction classes, the series of visits to works in progress is being carried out. Visits have been paid to Queen Mary-street and Dalmarnock road new public schools, where sixty students attended; while on the 19th inst. seventy students were present at the visit to the new portion of the Victoria Works. The lectures are given by the permission, and to the clerks of works for their kindness in being present and guiding them over the buildings.

INDICATING THE LEVEL OF WATER IN RESERVOIRS.—We hear that Mr. George Jennings, of Lambeth Palace-road, has entered into a contract with the Uxbridge Board for an installation apparatus and alarm bells between the engine-house and reservoir, the Board having adopted the apparatus on the recommendation of their Engineer, Mr.

W. L. Eves, A.R.I.B.A. This apparatus, for which Mr. Jennings was awarded a Bronze Medal (the highest award in the class) at the Electrical Exhibition, Crystal Palace, and which was described and illustrated in the Builder two or three years ago, has recently been adopted by the Sherborne Local Board between their reservoir and pumping-station. Mr. Jennings has also lately fixed similar apparatus for the Sutton-in-Ashfield Local Board, under the direction of Mr. George Hodson, C.E., who reported to the Board that the installation will be of the greatest value in indicating and recording at every moment throughout the year the exact quantity of water in the reservoir.

SURVEYORSHIP APPOINTMENT.—Mr. Moss Flower, C.E., has been appointed Surveyor and Sanitary Inspector to the Portishead Local Board. Mr. Flower continues his private practice in Bristol.

COUPLING FOR LIGHTNING-CONDUCTORS.—The patentee of this, mentioned in our Patents Column of last week, writes that the short description given there is not quite clear, and the latter part of it would be better put thus:—"Made in a single piece (approximately of link form), and having sockets at its upper and lower parts, the former being screw-threaded to receive the top rod (or elevation rod), the latter is of flattened and wedge shape, for retaining the tape, which is secured to the coupling by passing it through the socket, then doubling the tape on itself, so that when the tape is drawn back its end is jammed in the socket, and is effectually prevented from becoming detached."

MEETINGS.

SATURDAY, NOVEMBER 26. Artist's Benevolent Fund.—Annual Dinner, Sir Edward Clarke in the chair. Criterion, 7 p.m.

MONDAY, NOVEMBER 27. Society of Arts (Cantor Lectures)—Professor Vivian B. Lewin, "The Generation of Light from Coal Gas." 11. 8 p.m.

TUESDAY, NOVEMBER 29. Institution of Civil Engineers.—Mr. John Egby, M.A., on "The Manufacture of Small Arms." 8 p.m. Builders' Clerks' Benevolent Institution. Special General Meeting for the election of a pensioner. 7.30 p.m. Sanitary Institute (Lectures for Sanitary Officers).—Professor A. Wynter Elyth on "Sanitary Laws and Regulations governing the Metropolis." 8 p.m.

WEDNESDAY, NOVEMBER 30. Society of Arts.—Mr. James Douglas on "The Copper Resources of the United States." 8 p.m.

THURSDAY, DECEMBER 1. Society of Antiquaries.—8.30 p.m.

FRIDAY, DECEMBER 2. Architectural Association.—Mr. John Brett on "Day-light in the Dwelling-house." 7.30 p.m. Junior Engineering Society.—Mr. Harry Fraser on "Water-Tube Steam Boilers." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

15,910.—DRAIN TRAPS: J. R. Anderson.—This invention is designed to furnish an effectual means for testing the efficiency of house-drains without materially interfering with existing arrangements, provided that an intercepting sewer trap of modern construction has been placed between the house-drain and the sewer; such trap being usually built into a manhole or examination chamber. For this purpose the mouth of the trap is specially prepared for the purpose of stopping it, when required to be closed hermetically, by means of a stopper of suitable construction, conveniently placed in position, and at all times ready for use. When the body of the trap is made of iron or glazed pottery, a gun-metal bush is fixed therein by cementing or otherwise, the bush being bored with a tapering passage to receive a tapered gun-metal plug. In order to test drain provided with such a trap and a corresponding plug it is only necessary to remove the cover of the man-hole, lower the plug into the mouth of the trap, and fill up the drains and man-hole with water to such a level as will ensure the whole system of drains being thoroughly charged therewith. If the level of the water is then maintained, the drainage will be proved to be sound; if not, leakage will be detected at once.

19,198.—COLOURED STUCCO, &c.: D. Ward.—The patent refers to an invention for the making of coloured stucco, coloured concrete blocks, and tiles, by mixing colours with cement or lime (&c.), stucco which, when mixed with sand or rubble, and water, and allowed to dry, will form a hard, coloured substance, giving a permanent colour to whatever the material is used for, and as the colour permeates the whole substance it will last as long as the substance itself.

21,201.—SASH-FASTENERS: W. Diprose.—The object of this invention is the construction of a lock sash-fastener, requiring a key to open it, and which is impossible to open from the outside. To the meeting rail of the inner sash is fitted a mortice lock, and in the meeting rail of the outer sash a hole is formed for the lock bolt. Fitted to or formed with the bolt of the lock (which works horizontally) is a screw, screwing into a screw-plate fitted in the lock mortice in the inner meeting-rail, the end or head of the screw extending entirely or partially through the meeting-rail. The head of the screw may be made of any form, so that a key may fit on to it or into it, and by turning the key forces the bolt into the hole in the outer sash-meeting rail, thus locking the sashes securely.

21,689.—FLUSHING VALVES: W. Dawson.—This invention relates to improvements in the valves known as

WALTHAMSTOW.—For the erection and completion of church building, Markhouse-road, Walthamstow, for the Trustees of the United Methodist Free Churches, Mr. J. Williams Dunford, architect and surveyor, 106, Queen Victoria-street, London, E.C.:

John Allen & Sons.....	43,985	50 0
A. G. Barton.....	3,987	20 0
W. Marriages.....	3,500	50 0
L. H. Lipscomb.....	2,985	40 0
C. H. Martin & Co.....	2,723	130 0
W. Teat.....	2,625	—
W. Walling & Son.....	2,580	45 0
A. Martin.....	2,476	28 0
Solomon Hipwell.....	2,470	35 0
Edward Good.....	2,431	32 0
F. J. Coxhead, Leytonstone.....	2,343	40 0
A. Brown & Co.....	2,242	45 0

* Accepted, including facings.

WALTHAMSTOW.—For alterations, &c., at "The Chequers" Tavern, Walthamstow, for Messrs. Turner Bros., Messrs. Lee & Paine, architects:

Deering & Son.....	4,839	W. Shurman.....	4,792
Fuller.....	478		

WANSTED.—Accepted for stabling, &c. Mr. Herbert Riches, architect, 3 Crooked-lane, E.C.:

Thos. Gibson & Sons, Woodford, Essex.....	4,683	0 0
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(Lowest of four tenders received.)

WOKING.—Accepted for additions to "Holly Bank," St. John's, for Rev. A. B. Goulden, Mr. R. Champ, architect, Woking:

A. A. Gale, Woking.....	4,268	0 0
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WOKING.—For building business premises in the Chertsey-road, for Messrs. Saul Bros., Mr. Robert Champ, architect, Woking. Quantities by Mr. Edmund Overall, Rugby Chambers, Great-James-street, Bedford-square, W.C.:

W. H. Gaze.....	4,124	Jas. Harris & Son.....	41,650
Wentley & Sons.....	1,563	H. Jorgensen.....	1,379
E. Buckingham & Son.....	1,550	A. A. Gale, Woking.....	1,625

* Accepted.

WOKING.—For building a new club for the Woking Liberal Club Building Company, Limited, Mr. R. Champ, architect, Woking:

A. A. Gale.....	41,965	0 0
H. Ingham.....	845	0 0
W. R. Banks.....	890	0 0

* Accepted.

WREXHAM.—For new shop-front at No. 2, High-street, Wrexham, for Mr. William Beale, Messrs. Lash & Galt, architects, Wrexham:

Sage & Co.....	4168	15 0
B. Owen, Wrexham.....	428	0 0

* Accepted.

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Vol. LXIII. No. 2620.

DECEMBER 3, 1892.

ILLUSTRATIONS.

Cathedrals of England and Wales: XXV., St. David's, from the North-East.—Drawn by Mr. Roland W. Paul	Double-Page Ink-Photo.
Plan of St. David's Cathedral.—From Plan lent by Mr. T. Taylor Scott	Double-Page Photo-Litho.
St. David's Cathedral from the Courtyard of the Bishop's Palace.—From a Water-Colour Drawing by Mr. T. G. Jackson, A.R.A.	Double-Page Ink-Photo.
East Window, Skelton-in-Cleveland Church, Yorkshire.—By Messrs. Sbrigley & Hunt	Double-Page Ink-Photo.

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The Ruined Cities of Mashonaland.



THE more archaeological research is extended, the more matter seems to present itself for illustration and speculation. Even in the comparatively beaten tracks of Egyptian and Greek architecture we are now discovering that there is much left still to be discovered, and that our possible knowledge is by no means as yet complete; and outside of this region of architecture properly so called the world is from time to time being surprised by the discovery of the remains of ruder monuments of building—remains which have been unnoticed for hundreds if not thousands of years, overgrown by and nearly concealed in vegetation, which have been passed over by incurious civilised inhabitants of the district without notice, as if they were mere incidents of nature, or only turned to account occasionally in places from which squared stones can conveniently be obtained when wanted, but which are now attracting the attention of cultivated explorers, to whom they afford a new field for observation and conjecture. We are learning to recognise, apart from the architecture in which column and architrave are the important features, the existence in different parts of the world of remains of buildings which, while uncouth in plan and nearly devoid of architectural expression, were in their day great works of engineering, carried out with immense labour and some degree of skill, at all events the practical skill of making solid monumental masonry, and which give striking evidence of times when the main object in building was to provide a stronghold against attack; when those who had the leisure to carry out works which must have occupied a long time in execution, and during the execution of which they must have been comparatively unmolested, nevertheless used every means to provide against attacks from which they never could feel safe, and to render access to the stronghold as impregnable against defence from within as their primitive ingenuity could render it.

Remains of this class have a mysterious and almost provoking interest in the fact that it is in most cases almost impossible to date them with any approach to certainty. They present no architectural features by which their historic relation to other and tolerably well-dated styles can be assumed with probability, but on the other hand they often present remarkable and unexpected resemblances to remains of almost equally uncouth character in far-distant regions.

This latter consideration is suggested by the comparison of the plan of the great Zimbabwe in Mashonaland, given in Mr. Bent's book,* with that of the Nûrâgh in Sardinia given by MM. Perrot and Chipiez, and reproduced in the *Builder* of July 19, 1890 (page 41). This latter no doubt has a more business-like look of fortification about it, with its round towers interposed at intervals along the walls, but it is impossible not to recognise a family resemblance between the two plans in their irregular oval shape, in the long narrow passages and the jumble of plan-lines in the interior, and in the presence within the walls, in both cases, of a circular conical turret. The important difference is that in the Zimbabwe plan the conical turret is solid and is placed at the side of the enclosure, while in the Sardinian plan it is a habitable tower of defence and is near the centre and forms the culmination of plan. In the African example the conical tower or turret, of which (by the permission of the publishers) a view is given (fig. 1), is probably of a ritualistic or symbolical signification, and it differs in method of construction in one sense, for Mr. Bent informs us that the slope is formed by setting back each course from the one below it (the reverse of corbelling), so as to leave the face in a series of small steps, while according to Messrs. Perrot and Chipiez (who however are not always very accurate observers) the walls of the Sardinian tower are built in a regularly formed batter. The difference between the two, in this and other respects, would lead us to the conclusion that the Sardinian example was of much later date, and that the presence of the conical tower there is the survival of the original symbolical form, retained either with or without any reference to its original symbolism, and developed into a tower of defence. The differences between the two plans, the obvious progress towards a more rational and regular plan in the Sardinian structure, point to the same conclusion. Every approach towards regularity in setting out a plan is an index of a higher civilisation. Thus the remains of the Mexican cities and temples, laid out mostly on a rectangular scheme, indicate a much higher civilisation than the Sardinian plan, while the latter again is in advance of the Zimbabwe plan. The date of the Mexican remains is of course to be considered quite separately; but the geographical relation between Sardinia and Africa is closer, and we may imagine that in these Mashonaland ruins we have the remains of a very ancient semi-barbarous people, one of many kindred tribes migrating slowly about the vast continent of Africa for many centuries, and that in the Sardinian remains we have one of the examples of what this primitive style of building was by slow degrees transformed into among some of the tribes which belonged or had migrated to the northern regions of the African continent, and thence to Sardinia. We are not of course suggesting any direct connexion between regions so far apart as Sardinia and Mashonaland, but only that the ruins in the latter place are probably but a local example of a type of work which might have spread over a great portion of Africa, and of which many other remains may be found if looked for.

As to the possibility of a great age, an entirely pre-historic age, being assigned to these structures, Mr. Swan, who contributes the chapter on the orientation and measurement of the ruins, observes that though these walls would not remain long (comparatively) in this country, they might endure for an indefinite time in a clear atmosphere free from dust, and with annual tropical rains to wash away any accumulations of soil on the walls which might support vegetation that would destroy them.

"The few small plants which grow even on the oldest walls are of species which do not require much mineral matter for their growth, and whose roots are so soft that they mould themselves to the shape of the interstices of the walls, but do not press asunder the stone. Besides, the present

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* The Ruined Cities of Mashonaland, being a Record of Excavation and Exploration in 1891. By J. Theodore Bent, F.S.A., F.R.G.S. With a Chapter on the Orientation and Mensuration of the Temples, by R. M. W. Swan. London: Longmans, Green, & Co. 1892.



Fig. 1.—Remains of the Conical Turret at Zimbabwe.

inhabitants of the country do not use stone in any of their constructions, and never trouble themselves to remove stones from any existing walls, so that more stones have probably been disturbed during the two years of British occupation of the country than the Kaffirs would disturb in as many centuries."

Mr. Swan is of opinion that such a style of building as this could not have originated in South Africa, as such a development would have required a long time and a long and peaceful settlement in the country, and that it is clear from the nature of the fortifications that the builders never considered the country their own. We do not know that there is much in this latter argument. In uncivilised times men are all at war with and afraid of each other; those who are weak in defence are naturally pillaged; and the same argument might apply to French early Mediaeval castles, to prove that they were the work of an imported race. That the style of building may have connexions with Abyssinia and Arabia, as Mr. Swan suggests, is possible enough; in fact, it is with architectural remains as it has been said to be with quotations or proverbs; when you have traced a saying back to Homer there is still the question from whom Homer took it; and in like manner with architectural remains, when you have connected a particular form of building with a particular site, there is always the question what earlier site and people it was derived from. We may regard these remains in Mashonaland as only one leaf in a little-explored chapter of archaeology, and there is probably a good deal more to be found in quarters where more civilised nations have not penetrated to destroy the ruins and use up the stones in their own work, which is their usual fate in such a case.

Among the remarkable points in these ruins is the use of granite in small blocks, which Mr. Bent suggests is an indication that the walls were built by a people formerly accustomed to build in bricks, and using the stone in similar proportions and manner. The walls on either side of the narrow passage round the outside of the plan on the east side are nearly 30 ft. in height, "and built with such evenness of courses and symmetry that as a specimen of the dry builder's art it is without a parallel." The narrow passage itself is a very peculiar feature of the structure; it leads round the eastern margin of the site direct to the space in which the conical tower is situated, and might have

been intended as a kind of access to the sacred place (if we take that view of the tower), only that the latter appears to be accessible by other openings. Is it not possible that the walls were simply a double line of defence, and the passage a safe means of communication between the exterior gateway and the courtyard in which the tower stood? Through the thick outer wall, at one point in this passage, is a hole 8 in. square driven straight through the masonry at a height of about 4 ft. above the base. Mr. Swan, who writes the chapter on the supposed orientation of the building, is perplexed to account for this channel through the wall, and can suggest no meaning for it. Was it not possibly simply a means of inspection directed to command some likely spot for the approach of an attacking party? There seems a little too much disposition to make mysteries of things in ancient remains which may be susceptible of a very commonplace practical interpretation.

About the conical tower, however, we admit, there is a mystery—unless indeed it was a

There is a small similar cone close to the large one, and it is certainly significant, and seems as if it could hardly be accidental, that the diameter of the large tower at its base is exactly equal to the circumference of the small one. As Mr. Swan says, "when the minds of men were first interested in geometry it would at once seem to them that there must be some constant ratio between the circumference of a circle and its diameter, and they would easily discover what this ratio was, and they may have considered this discovery so important and significant that they desired to express it in their architecture." But in regard to other suggestions in Mr. Swan's chapter, we cannot help thinking that he is making out too much. We should find it difficult to believe that the people who planned a building on such irregular lines as these straggling congeries of walls present on plan, would at the same time have been so particular as he suggests in regard to alignment of different points in relation to orientation. Such refinements are likely enough to be found in ancient buildings that are planned on geometrical lines; but if the builders of Zimbabwe had geometry enough to set out certain points in their walls in relation to the position of the heavenly bodies, it might be supposed that they would have geometrical instinct enough to set their lines out straight, or in regular instead of irregular and broken curves. The altar is shown as on the axis of the line of true north in reference to the narrow entrance on the north side of the plan; but we do not gather that the actual "altar" was found, only its supposed position indicated by the finding of phalli and other relics, and we cannot help feeling a little sceptical even about this true north line of altar and entrance, which do not seem to have any other constructive relation with each other. The authors see a special symbolism, also, in the existence of an exterior wall-pattern at Zimbabwe (shown in the general view of this part of the ruins in fig. 3*), which is only continued round a portion of the wall, and which nearly coincides, but is not we think made out to pre-



Fig. 2.—Coin of Byblos, showing Conical Erection.

watch-tower; but that would not account for its peculiar shape, and the coin of Byblos (fig. 2), showing a conical erection of such form as the Zimbabwe one would take if complete, is certainly significant, and seems to suggest a common origin for the two.

* The ornament of which a larger drawing is given in the book shows a backing of very small stones behind the cross-pieces, which is not discernible in the view.



Fig. 3.—View of South-Eastern Portion of Outer Wall at Zimbabwe, showing the Ornamental Courses.

cisely coincide, with the portion of the exterior wall on which the sun can shine at one or other season of the year. This kind of pattern, we are told, occurs in other remains in the country, and is always found in the south-eastern portion of the walls; although we observe that in the plan of the ruins at Matindele, printed immediately over that of Zimbabwe, the part of the wall marked as decorated with a pattern faces almost directly west, so that here is a contradiction at the outset. No doubt, whatever way we take it, the existence of this simple form of decoration in buildings of this kind, and the fact that it is only carried round a portion of the walls and apparently deliberately stopped at certain points, is an interesting one to note; but the comparison with the apparently much more haphazard placing of this kind of ornament at Matindele leads us to doubt very much whether it has the symbolical significance attributed to it. The tower probably is symbolical, and has a phallic origin, and phallic emblems were found in plenty about the ruins.

Among the small objects, not very numerous, in the shape of utensils or decorative articles, which were found at Zimbabwe and elsewhere, the most important and interesting are the conventional carvings of a bird representing probably a vulture, executed in soapstone, and of which several were found, which had apparently decorated the wall of a semi-circular temple on a hill near the great Zimbabwe ruin. The largest-sized birds are over five feet high, and considering the kind of place in connexion with which they were found, they have more artistic merit and power than might have been expected. These monumental-looking birds sit on the top of soapstone pillars, and though very broadly treated, with little of realistic effect, they give the character of the bird well; the legs only, and their joining on to the body, appearing to have been difficult to the carver. The few fragments of pottery found show those forms of simple ridge-and-furrow pattern which are to be met with in ancient and prehistoric pottery all the world over. Some of the iron tools are of interest; and there is a really curious object in the shape of a thick cheese-like disc, studded at the sides with projections regularly spaced, somewhat resembling in other respects the pill symbol so well known in the arms of the Medici, which is compared with an illustration of a very

similar though smaller object from Paphos, now in the Fitzwilliam Museum, studded with projecting studs executed in relief on the marble. All that the author can suggest in regard to the meaning or use of either object is that "they remind one of Hierodion's description of the sacred cone in the great Phœnician Temple of the Sun at Emesa in Syria, which was adorned with certain knobs or protuberances, a pattern supposed by him to represent the sun, and common in phallic decorations." We feel some doubt however about the identical nature of the two objects, for the reason that the one from Zimbabwe (according to the illustration) is a cylinder, and that from Paphos is a frustum of a cone; an important difference, whether we regard them as symbols or as things for any practical use. Another very curious find was a soapstone mould for casting ingots of tin. A comparison of this mould with an ingot of tin found in Falmouth harbour can hardly leave much doubt as to the object of the mould, which suggests how very wide was the extent of this traffic in the ancient world, and how remarkable was the prevalence of a common habit in the treatment of the metal for the market. It is difficult to understand any practical reason for this particular shape for casting tin (a parallelogram with long notches cut out of the two ends), the only practical effect of which would be to make the same weight of metal take up more space in packing than if the notching were omitted. We may conclude however that there must have been some reason, either commercial or practical, for the wide adoption of this form of ingot.

There is a good deal of interesting writing in the way of notes and observations on the people of the country, and the book, though a merely popular one, is thoroughly readable, and will assist in drawing public attention to a province of archaeology in which there is probably a good deal more yet to be explored.

A LARGE DRESSED STONE.—The stoop-stone laid in front of the Huntington Mansion, Fifth Avenue and Fifty-seventh-street, New York, is the largest dressed stone ever carried by rail in the United States, and probably anywhere. It weighs 24 tons, and measures 22 ft. by 15 ft., its thickness being 8 in. It has been dressed at Messrs. J. J. & F. P. Treanor's stone works, Hastings-on-the-Hudson, and was brought to New York on Treanor's patent stone car. The next largest stoop-stone in New York is in front of the Vanderbilt Mansion; it weighs 18 tons.

JAPANESE STENCIL PATTERNS.

IN this country we are accustomed to consider stencilled patterns as an inferior and mechanical method of producing ornament, only to be countenanced from motives of sheer economy and as a bad substitute for free-hand design. The beautiful collection of Japanese stencilled patterns which Mr. Tuer has put forth* is calculated to make one regard this art from a new point of view. In the deft hands of the Japanese it appears that stencil may be made to lose much of its mechanical appearance, and that it can be made the medium of producing diaper patterns in which the stiffness and formality supposed to be inherent in stencil work are so happily masked that we can almost forget the manner in which the work is produced.

Independently of the faculty of the Japanese for the production of free and informal-looking repetition designs, there can be no doubt that some of the freedom and delicacy of the designs illustrated in this book is due to the material in which the stencil-plate is made. We are accustomed to use stencil-plates of thin metal or thick card or pasteboard, in which it is difficult to cut a fine line. The Japanese use a tolerably thin brown paper, in which the pattern is cut out double, the two pieces being then pasted together, with when necessary a series of threads pasted in between them and crossing the openings, so as to assist in holding the whole together, while not interfering perceptibly with the design. Such is the account given by Mr. Tuer, who says in his title-page that he "knows nothing about it," but appears to have taken a little trouble to investigate the process. These auxiliary threads are not present or necessary in all designs, they are employed when the character of the design is such as to lead to a number of rather long slits in the pattern without sufficient cross support. In general however, the Japanese designers are exceedingly ingenious in devising their stencil patterns so as to preserve a sufficient amount of lateral support to the solid portions with-

* The Book of Delightful and Strange Designs, being one hundred facsimile illustrations of the art of the Japanese stencil-cutter to which the gentle reader is introduced by one Andrew Tuer, F.S.A., who knows nothing at all about it. London: The Leadenhall Press, and Simpkin, Marshall, & Co., London, Paris, and Yokohama: Liberty & Co., New York: Charles Scribner's Sons. Paris: Baudry et Cie. Leipzig: Brockhaus.



Fig. 1.



Fig. 2.

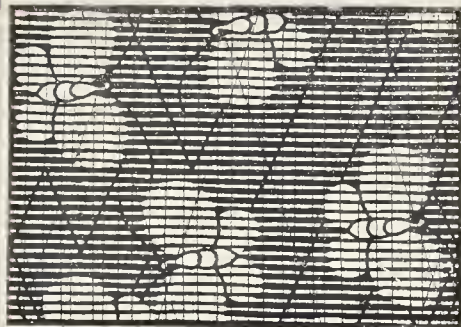


Fig. 3.

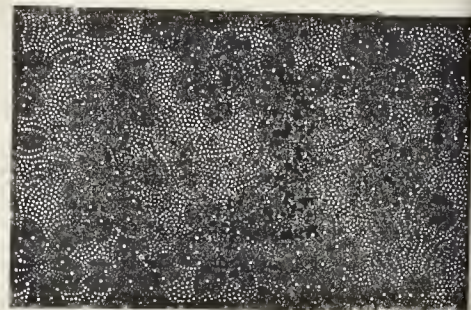


Fig. 4.

Japanese Stencil Patterns.

out interrupting the apparent freedom of the design. The stencil pattern being cut out of the thin paper with a small sharp knife, used more like a graver than a knife in the ordinary sense, allows of a freedom of line and delicacy of detail which are impossible in cutting from a more tough and stubborn material. On the other hand it cannot be denied that the use of this more fragile material militates against the life of the stencil-plate, which is much more quickly worn out than one of more robust material. But this,

perhaps, can hardly be said to be a disadvantage from an artistic point of view; it tends to prevent the repetition of a design *ad nauseam*, and affords scope and temptation for the continual production of new patterns. In Mr. Tuer's publication one of the original stencil-plates is bound in as a kind of frontispiece to each volume, so that the possessor can have by him not only the results, but an example of the means by which they are produced. A different stencil-plate is inserted in each copy, so that each has a certain in-

dividual character so far as this addition is concerned.

We have to thank Mr. Tuer for permission to reproduce on a reduced scale four out of the 104 designs contained in his book, and may draw attention to some of the characteristics displayed in them. Fig. 1 (No. 4 in the book), reproduced to half the original size, is an example of a class of ornamental work to which the Japanese are very partial in painted designs, consisting of birds at different angles, the lines crossing each other and filling up

background of the ornament. This is a repeating pattern in one direction only (vertically), being apparently intended for an upright panel of the width of the design; but the idea of mechanical repetition would certainly not force itself on the eye in execution, if the repeats were carefully laid down. In this and all the others the dark portion of the design represents the solids of the stencil-plate, and the whites the openings. In the long white wing-feathers of the birds, it will be seen how cleverly the artist has managed to provide cross-ties by giving a black banding to the white feathers, which seems to come in quite naturally and helps the effect of the design, while it provides the necessary stiffening for slits which would otherwise be too long to stand the working without wrinkling up. In fig. 2 (No. 7 in the book), a most effective piece of conventional floral diaper, the mechanical conditions of the process are again made to lend themselves to the spirit of the design: in the white flowers the lines, which form the bars, are necessarily continuous, in the dark ones the lines, which are cuts in the paper, are necessarily discontinuous, and appear as if sketched in lightly, thus giving to the two classes of flowers a contrast of style and texture which arises naturally out of the conditions of the process. Figs. 3 and 4 (Nos. 53 and 79 in the book), are smaller stencils, reproduced here a little more than half size. Fig. 3 is charmingly ingenious, the figures of the moths being produced, as will be seen, simply by a thinning of the parallel bars of the stencil, so that the forms of the insects come out in a half-shadowy manner, quite different from the effect of hard outline generally seen in stencil work. Nothing could be more characteristic of the delicate instinct of the Japanese in this kind of work than this incident. This is one of the stencil-plates into which cross threads are worked, the nature of the pattern requiring this support. Fig. 4 is an example, one of several in the book, of the decorative effect which can be produced by a mere arrangement of pin-holes; not "pin-holes" literally; the Japanese is much too neat a workman for that; pin-holes would leave a raised burr which would spoil the working of the stencil; all the little holes are punched out.

These examples will be sufficient to indicate that there is a degree of decorative poetry to be got out of stencil work such as we very seldom achieve or even aim at in England. Not that we consider all the designs in the book as admirable as these which we have selected. Some of them are too grotesque in effect, and too angular and abrupt in line; some of them are mere imitations of basket-work and hurdles and such things, which (Japanese or European) are in false taste, though they are all treated with a vigour of execution which gives them a certain interest. There are a good many others however, quite equal in artistic feeling and originality to those we have reproduced, and their variety of *motif* is most remarkable. One shows delicate meandering sprays of flowers, as if drawn with a pencil; in others scattered conventional leaves or flowers seem to emerge from a ground work of netted or waved lines; in another a series of Japanese parasols are combined into an effective diaper; another consists of a number of little dot-and-dash sketches of figures of men in all kinds of attitudes, indicated only in a highly conventionalised manner, making a spotty pattern the real constituents of which are only recognised on a close inspection. This is one of the curiosities of the book, rather than one of its beauties; but the beauties are predominant, and it is a book which every ornamentist may be glad to possess.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.—A special general meeting of this Institution was held on Tuesday evening last, for the purpose of electing a pensioner on the Relief Fund. The President, Mr. Colin C. Patrick, gave some particulars of the case, after which the applicant, Mrs. Sarah M. Enright, was duly elected by show of hands, being the only candidate. Mrs. Enright is the thirty-fifth pensioner elected since the foundation of the Institution.

NOTES.

THAT is announced that Mr. Tate has accepted the offer of a site for his gallery of British art on part of the site of the Millbank prison, which is to be forthwith cleared. This clearance will give unquestionably a very fine site for important buildings, though we should consider it, practically, more out of the way than Kensington for a gallery of this kind. In other respects, no doubt, the site is a fine one, so much so that we regret that there does not seem a chance of its architectural occupation being commenced by a finer piece of architecture than the new gallery is likely to be, Mr. Tate being apparently much more apt to please with an architectural design than with a site for the building. The projected design, which we published some time since, represents no doubt what the majority will deem a satisfactory and respectable-looking piece of architecture for the purpose, but we cannot pretend to think that it is all that could be wished for in such a case. A building for such a purpose as a gallery of British art ought in itself to be an example of the best architectural art of the day, by one of the first architects of the day, as would undoubtedly be the case in Paris if a similar project were to be carried out.

THERE is so much to condemn in the management of their business by the London County Council, that it is satisfactory to find that they can, from time to time, remain in safer courses. Last week the Bridges Committee proposed that the tender of Green & Co. for the construction of a ferry-boat at Woolwich should be accepted. The amount of the tender was 17,325*l.* The tender of Simons & Co. (of the Clyde) was only 15,800*l.*, and there was nothing to be said against the firm. But Green & Co. had their works on the Thames, and the Committee recommended that the higher tender should be accepted because it would give employment to London workmen. The general body of the Council, by a considerable majority, had the good sense to negative this proposal, which was altogether opposed to sound business principles. It is doubtful even whether the object of the Committee would have been attained, since it is more than probable that workmen from the north would have been obtained to put on this job. If the proposal of the Committee had been carried it would have been neither more nor less than a gift of the taxpayers' money to certain workmen. It is to be hoped that the Council are beginning to see the error of their ways.

THE London Chamber of Arbitration was formally opened last week by the Lord Mayor, when full details of the history of the movement, and of the constitution and objects of the Chamber, were given by the chairman of the Committee of Management, Mr. H. Clarke. In referring to the work of the Chamber a week or two ago, we alluded to the wide scope of its operations, and it appears that the list of arbitrators already agreed upon numbers 450, while ultimately there will be no fewer than 1,000 on the list, none of whom will be registered until the Council have been fully satisfied as to their qualifications. As the submission of questions to the arbitration of the Chamber is a purely voluntary matter, neither party will be allowed to retract without the consent of the other, and the award will thus be, to a very great extent, binding. The President of the Board of Trade, in the course of his speech at the inaugural proceedings, emphasised the fact that when one party to a dispute shows an unwillingness to submit his case to arbitration, he places himself in a bad position in the eyes of the public. Now, with such a choice as is afforded by the new Chamber, the reluctant disputant cannot so easily excuse himself by pleading lack of con-

fidence in the ability of the arbitrator, as he might have done had the arrangements made been on a more limited scale. Mr. Mundella could fairly claim credit to himself in regard to the "conciliation" clauses of the Railway and Canal Traffic Act, which have proved so useful in the settlement of railway disputes. True, the President of the Board of Trade is not the actual author of the Act passed in 1888, but he may be termed the "father" of these clauses, inasmuch as they were first proposed in his Railway Bill of 1886. Mr. Mundella observed, on introducing them to the House of Commons, that "these clauses are entirely new, and may excite a little harmless ridicule, but I am prepared to take the responsibility," and, as a matter of fact, the discussion of the novel mode of procedure did excite some laughter at the time. The Bill of 1886 fell through, and the "conciliation" clauses were quietly dropped out of the succeeding measure, but only to reappear and be finally adopted a year later. The new Chamber will lack one feature which characterises the arbitration on railway matters before the Board of Trade, *viz.*, publicity. The Annual Report under the Railway and Canal Traffic Act is a decided element of usefulness in connexion with those proceedings; indeed, Mr. Mundella could hardly have been in a position to point to the success which has so far attended them, were the nature and results of the conferences between disputants kept secret—as we understand they will be in the case of the new chamber. Time will show whether anything corresponding to the Report alluded to will be found practicable.

THE daily press has lately told the story of various extensive fires in London, and, as usual, the refrain to the reports is to the effect that the premises attacked were practically gutted. The old story recurs of many fire-engines being brought together, gallantry being shown, and at last either the fire burning itself out, being cut off, or even swamped. The Metropolitan Fire Brigade may or may not be well organised, efficient, and systematic in its work, but surely the fire-protection of London should not depend only on the quality of its mere fire-extinguishing resources. Our Building Act, of course, pays attention to the question, but many of its sections treating of fire-rieks could be improved upon; and further, although fire-offices do some fire-surveying in their own interest, it is high time that we had some legislation by which at least the warehouse class of structures came under regular official control. The public receives no official instruction as to self-help in cases of fire, and even the facilities of calling for outside help,—*i.e.*, the fire brigade,—although improved of late, are so unsystematically arranged and generally unknown that they are of comparatively little use. The amount of aid at once obtainable both for ordinary and serious fires is generally ridiculously small, partly owing to the brigade being numerically too weak to cope with the area and class of property of London; and although some authorities, when speaking of London fire protection, include the Salvage Corps as a protective force, this body (owned by the self-interested fire-offices) mainly exists to counteract some of the unnecessary water damage done by the firemen. Last, not least, we would mention that the fire inquests so often proposed do not as yet exist, except within the limited jurisdiction of the Lord Mayor,—that is to say, in what is called "the City." The *Times* of the 28th ult. shows us that London is not the only city in Great Britain where there is something amiss in matters of fire protection. It might be well if a country that has a national loss by fire of about 9,000,000*l.* annually, and further bears taxes in the shape of insurance premiums to the extent of 6,900,000*l.* besides the rates and

voluntary contributions for fire brigades, paid more serious attention to the protection of its cities, and recognised Urban-Fire Protection as a special science, as in some continental countries.

IN reference to our recent article on range boiler explosions, Mr. Kinnell, of the firm of C. P. Kinnell & Co., writes to us in a very dictatorial style to the effect that we have misled the public by stating that safety-valves on boilers will afford security from explosion, and denying that they will; his reason being that in the case of a red-hot empty boiler into which water is introduced the pressure of steam is too sudden and violent to allow time for a safety-valve to act. On inquiry we find that our correspondent is unable to cite any case within his own knowledge in which a boiler furnished with a safety-valve did burst under those circumstances. While he has no negative evidence to offer, we have the positive evidence of a case in which the boiler had been empty for a considerable part of the twenty-four hours, without the knowledge of the inmates of the house, and when the water came in at the usual supply time the explosion of steam was so violent that part of the brass-work of the safety-valve was crumpled as if by a blow from a heavy hammer; but the boiler was entirely uninjured. The safety-valve was a spring one; we do not recommend these as the best, as there is always a possible element of going wrong in a spring; the dead-weight safety-valve is the most reliable, as that is merely lifting a weight, and there is nothing to get out of order. In reference to our correspondent's criticism we will go so far as to say that the fact of a safety-valve (even not of the best kind) having saved a boiler once under this extreme stress is not a proof that it will always do so, and that it is much better to avoid all the causes of danger, and have a safety-valve as well, which can do no harm, and is an important additional precaution. We may also add that it is possible to make an important improvement in safety-valves of this description for range boilers. They are at present made with much the same diameter of steam-way as is allowed for relieving a boiler from gradually increasing pressure, whereas the range boiler safety-valve is required especially to provide against a very sudden expansion, and its steamway should as it appears to us, be increased accordingly; a point which we commend to the attention of the makers of range boiler safety-valves. In the meantime the undoubted fact that one of the existing pattern of spring safety-valves, with these disadvantages, has saved life in averting a serious explosion, is a reason for thinking that it will do so again, though we admit that it may not be safe to assert positively that it will *always* do so.

ADDITIONS to the Record Office will shortly be commenced. The foundations are practically complete, and the superstructure will now be taken in hand. The extension will occupy a portion of the east side of Chancery-lane, the old houses in which have recently been pulled down, and the style chosen has been in accordance with the existing portion in Fetter-lane, designed by the late Sir James Pennethorne. The central portion, over the gateway, will be carried up as a tower, and the blocks on either side will have turrets at the angles. When completed the scheme will include a block at the northern end of the Chancery-lane front running back at right-angles to it, covering the site of the present Rolls House, incorporating the old Rolls Chapel, and connecting with the existing building in Fetter-lane. A lower range of buildings will run parallel with this on the south side, leaving a carriage-way which will connect Fetter-lane and Chancery-lane, forming, in fact, a long and somewhat narrow court-yard. The extensions are being carried out under the superintendence of Mr. John Taylor, of Her Majesty's Office of Works.

HERR SCHWERZECK, a young Viennese sculptor, has unquestionably won his archaeological spurs by the interesting discovery revealed in the *Athenaeum* for last week. If a moral may be pointed, this shows clearly enough how much the archaeologist needs the artist, and also what a gain a new eye is, even to the best organised museum. Perception stales rapidly. As Herr Schwerzeck is engaged in the restoration of the Parthenon pediments, he possibly has views as to the naming of the figures; if so, now is the time to let us know them. Is he going to call his newly-placed figure Palemon, the sea-god? We hope not, though tradition has existed to that effect. Palemon involves Leucothea, and this Kabiric goddess is strangely out of place on purely Athenian soil. Perhaps he will have a word to say for Dr. Furtwangler's theory, to which we long ago called attention, but which the Museum catalogue steadily ignores (p. 129).

THE Rector and Churchwardens, in conjunction with the District Board, of St. John's, Hackney, intend to apply for a faculty allowing them to remove the tombstones and monuments in the burial-ground adjoining the parish church and the (old) Town-hall. The graveyard contains six acres, of which one and a half acres have been recently converted into an open space. Plans and estimates are prepared for laying-out nearly three acres of the remainder, at a cost of about 9000. In a letter from Lord Meath, printed in the *Times* of last Tuesday, we read that the Hackney Board of Works are willing to maintain these four and a half acres as an open space. The trees, including some fine horse-chestnuts and elms, were planted at the end of last century; some of the latter faded away a few years since. Lord Meath also says that the District Board are prepared to maintain another open space, if obtained, in this parish,—being the enclosure of St. Thomas's-square, belonging to St. Thomas's Hospital, and which, it is anticipated, the owners may perhaps give over for that purpose. The square could be placed in a suitable state at an estimated outlay of 3500. These, with one or two similar objects, are commended to the benevolence of the rich by the Metropolitan Public Gardens Association. The old Town-hall stands, it is believed, on the site of the "Church House," described by Lysons, and built in 1520 for parochial uses. The former parish church, dedicated to St. Augustine, was rebuilt at that time. In 1738-9 the nave, aisles, and chancel were pulled down; but they left the more ancient tower to serve as a belfry, and the Rowe chapel (1614). Mr. R. Simpson's book, printed for private circulation in 1879, contains some interesting notices of celebrated inhabitants of Hackney (including John Strype, the antiquary), and the monuments, whereof a few are preserved in the new Church of St. John. We may refer our readers to an article and a "Note" in the *Builder* of June 21, 1884 and December 5, 1891 respectively, for further particulars.

THOUGH one or two of the best names in the Society are little represented (Mr. Alfred Hunt having only one drawing and Mr. Allingham only two), the winter exhibition of the Society of Painters in Watercolours is an admirable one, remarkable for the generally high level attained, and the varied interest of the drawings. The fact that Mr. Holman Hunt contributes a considerable number of drawings, grouped together at one end of the room, will give a special interest to this year's exhibition. These, except two sheets of portrait studies in silver-point, are to illustrate a new edition of Sir Edwin Arnold's "Light of the World" (we wish they were attached to some work which would have a more permanent literary value), and include a study of a bit of Byzantine architectural

detail; two pen drawings, "The Euseb Treasure" and "Christ before Pilate"; a water-colour illustration of "To him that knocketh it shall be opened," which is the most original in the collection, and other studies which we cannot admire in spite of their defiant originality. Among the drawings of more usual standard are several which resemble each other in that adoption of a level and frieze-like composition which has become rather a fashion among certain artists; Mr. Norman Taylor's "Golden Gatherings" for instance (3), a stream, a bank, and a group of gleaners passing along the bank, all in parallel lines across the picture; Mr. Tom Lloyd's "Sunrise on the Marsh" (16) not quite so geometrical, but with the same tendency, and a group of cattle passing along the centre; the same artist's "A Breezy Hay-time" (39), in which this parallel arrangement of stream, bank, and figures is again employed; the figures are of much grace and character, but the effect of wind is hardly given, in spite of the heaving rushes. Mr. A. Goodwin's "A Sea-Dirge" (4), a dark little picture with the ribs of a wrecked vessel in the foreground and the sea breaking in the distance beneath a bar of red in the sky, is a fine poetic thing. Mr. R. W. Allan has produced a grand and broad landscape sketch in his "Summer Day in the Highlands" (15); his Sussex and Rothenburg sketches are too black, but his "Across the Sands" (103), with the breezy tumble of clouds above, is fine. Mr. Thorne Waite's "Carting Corn" (31) is a powerfully-treated composition with the cart and horses in the immediate foreground and a wide distance of sea and sand-bank behind. Among others of the larger landscapes, Mr. Cuthbert Rigby's "Roman Bridge over the Brathay" (65) is a noble work; Mr. Tom Lloyd's "Sound of the Sickle" (86), a large drawing with two figures in the foreground under the shadow of a tree, and a slope of sunlit cornfield beyond, is rather pretty than powerful, one of the most finished but not one of the most effective of his works; but his "Close of a Midsummer Day" (167) is in his finest style. Mr. A. Hunt's one drawing is a study of Cumberland mountains, "Arncliffe Fell" (163), a grand painting on a small scale (or the reverse way, if the reader likes to put it so). Mr. Allingham's little "Isle of Wight Cottage" (177) is one of her most beautiful works. Mr. Albert Goodwin as usual presents us with various delicate studies of town scenery—"Canterbury from the West Gate Tower" (25), "The Via Fillunger, Lucca—Italian Moonlight" (99), "Salisbury Close" (146) and "Salisbury Cross" (168), "Oxford (from Radcliffe, looking east)" (115), and another view, the finer, looking west from the same station (175); he sends also a charming view in the pretty old village of Ightham (238), and a fine rather Turmeresque picture of "the Carrara Mountains" (191). Mr. David Murray exhibits what seems a small Corot under the title "Evening" (193), Mr. Eyre Walker a characteristic landscape in which "Willow and Osier" (197) are the prominent subject; Mr. Napier Henry shows "Clovell" (207) in a westerly gale, a heavy long swell setting in round the old stone jetty; Mr. Walter Field has a very real moonlight effect on the convent terrace at Amalfi (219); Mr. Charles Gregory paints the "Val d'Aute, Falaise" (235) in his characteristically thorough manner. There are various semi-decorative treatments of landscape by Mr. Walter Crane, which are to our thinking more curious than successful. Among works of architectural interest (other than those already mentioned) are Mr. Gregory's "In Caudebec" (24); Mr. S. J. Hodson's "Bridge over the Reuss, Lucerne" (32) and the same artist's "Palazzo Communale, Siena" (43) and "Ponte Pietra, Verona" (179); Mr. Gregory's "A Corner in Rouen" (176); Mr. H. Marshall's "Chelsea Embankment" (322) and "St. Pancras" (349); and Mr. T. M. Rooke's "View of Vitre" and "Walls of Fougères" (338). Mr. Burne-Jones sends a study of a head for "The Golden Stairs" (364), and Mr. Henry

Wallis two superb "still life" drawings in the shape of studies of "A Persian Vase" (327) and "A Damascus Vase" (333), which in their way are unsurpassable.

AN interesting exhibition has been opened at 29, Queen's-square, Bloomsbury, by the Art for Schools Association, and will remain open until December 12. This Association, now becoming well known, introduces art education to schools of all descriptions by loan exhibitions of pictures. Good prints, engravings, etchings, lithographs, and photographs of beautiful and interesting works of art form the collections. Special arrangements with art publishers allow these to be supplied to elementary schools at greatly reduced prices. Not only are collections sent to schools on loan, but donations to poor schools of pictures are also made. The present exhibition contains specially selected framed pictures suitable for school prizes or Christmas presents; these are mostly either photographs, photogravures, autotypes, etchings or chromolithographs. Amongst artists represented by reproductions of their works are G. F. Watts and W. L. Wyllie, J. M. W. Turner, Leonardo da Vinci, Velasquez, Vandyck, D. G. Rossetti, Sir Joshua Reynolds, Rembrandt, Angelica Kauffman, Burne-Jones, Birket Foster, Direr, Botticelli. Excellent reproductions, in these ure, of the work of such artists cannot fail to make an interesting collection, well worth a visit. The Association is to be congratulated upon its capital selection, and the means employed to exert artistic influence over the minds of the young deserve success.

A TOLERABLY large collection of miniatures,—the property, we believe, of one owner,—is on view at the Fine Art Society's gallery. The collection is so interesting historically and socially as collections of miniature portraits always are, and includes a certain proportion of really fine works in an artistic sense; some of these, however have been rather recently seen at the Burlington Fine Arts Club.

THE Waterways of England" is the title of a small collection of good but rather mannered oil-paintings by the Hon. Stephen Coleridge, now exhibited at Messrs. Dowdeswell's Gallery. The artist is fond of a rich brown colouring, which is somewhat artificial though effective, and does not convey the sense of open-air nature. The effect of the white sail in the midst of a corner of dark rees reflected in dark water is well given in "The Weir at Pyrford" (19); and the large landscape "On the Norfolk Brouds" (23) is a good work, spoiled to some extent by a rather muddy sky. In the same gallery is a collection of portraits and studies (un-catalogued) by Prince Pierre Trouhetskoy, which are very "impressionist" in tendency, but show a great deal of spirit and appreciation of movement and colour. A life-size painting of a young girl holding a tennis-racket is full of life and colour, and there is an exceedingly clever half-length sketch of a woman in a large white cap, turning nearly away from the spectator. Prince Trouhetskoy apparently, from an announcement posted on Messrs. Dowdeswell's walls, wishes to take up portrait-painting as a profession, and should have some success.

WHAT to say of the ninth exhibition of the English Art Club (Dudley Gallery) we hardly know, except that it appears to us that the pictures really worth looking at are such as are out of the professed line of artistic faith of the club, and would be notable anywhere. Such are Mr. Sargent's "Portrait of Miss Duncomb" (99), a little affected in attitude, but admirably painted, and more highly and smoothly finished than is usual with the painter, as if out of sheer contradiction to the aims of the impressionist exhibition to which it is sent.

Mr. Shannon's portrait of Mr. Glazebrook (19), again, is quite in the *juste milieu*, and M. Hellen's dry-point studies of heads are admirable. Of the unfinished sketches (as we should call them) which make up a great part of the collection, some have effect and feeling, others are merely "unfinished." It may appear significant to the author of No. 2, for instance, to paint a mill-stream so that it looks like a wall; to us it merely seems that he cannot represent water, and has not tried. As to such things as Mr. Sickett's "Study of Expression" (43), Mr. Sauter's portrait (74), in which the face looks as if painted in dirt rather than in colour; Mr. Sickett's portrait of a musical songstress (91), and Mr. Wilson Steer's "Boulogne Sands" (8) and procession of yachts (96), it appears to us little short of an insult to educated persons to put such things on a wall for them to look at.

THE following advertisement appears in a London local paper:—

Architect and Surveyor.

Surveys, Plans, Drawings, and Specifications for New Buildings and Alterations prepared. Perspectives in Colour or Line. Properties managed and Rents Collected. Estates Surveyed, Dotted, Laid-out, and Roads formed and developed. Mortgages negotiated. Surveys for Dilapidations and Repairs, and Valuations made. Sanitary Inspections undertaken, and Reports furnished thereon. Quantities taken out and priced for competition. Works measured up and Valued.

All Business entrusted to Mr. — will be promptly carried out at nominal and fixed charges.

This is an amusing comment on the subject of "Architecture a Profession or an Art." It will not surprise most of our readers to learn that the advertiser is a member of the so-called "Society of Architects," which is endeavouring to purify and raise the status of the Profession by Registration.

LETTER FROM PARIS.

WE published (on February 14, 1891) a historical sketch of the different bridges which connect the two sides of the Seine in the neighbourhood of Paris, we think it may now be useful to complete this sketch by giving an account of some of the works which are being carried out to improve the bridges. Independently of the Pont Mirabeau, at the west of Paris, between the quarters Auteuil and Javel, of which the works will shortly be commenced, there is a question again raised of a "Pont du Louvre," the need of which is every day more felt. This bridge will put the Louvre quarter into communication with the Rue de Rennes, and will be continued as far as the Seine, which will relieve the congestion caused by the narrow Rue Bonaparte and by the Rue des Saints Peres, which is not on the axis of the bridge of that name leading to the Place du Carrousel. The municipal service is now employed in altering the "Pont de la Tonnelie," that of "l'Archevêché" and the "Pont Notre Dame," which, on account of the size of its piers, is a source of serious danger to navigation. There is also a project to enlarge the pont "de la Concorde," which has become altogether insufficient for the increased traffic. This work is indispensable, at least if the work of making the Pont de Constantine is not carried out, which would be the inevitable consequence of prolonging the railway from Moulieux and the Champ de Mars to the Esplanade des Invalides. There is, therefore, quite a plan of campaign, which will be connected in some degree with the preparations for the future exhibition, the site of which is still being discussed at the Ministère du Commerce. The partisans who uphold a Champ de Mars exhibition are trying to carry a project which meets with but little encouragement from the Parisian public. It is difficult to imagine what success a new exhibition can have which is a re-edition of the old. What is

wanted is something new, and that can no more be offered in the Champ de Mars than in the Trocadéro. The Municipality of Paris has committed a grave error in preserving palaces which offer only a passing interest, and the expenses of which are a serious drain on the Municipal finances, besides being obliged to be constantly utilised by every possible means. If the Champ de Mars is definitely settled upon, it will be necessary to make a clean sweep of everything that is there, and have a great architectural composition for the new exhibition. On the other hand, the adoption of the "rond-point" of Courbevoie will entirely transform the bare plateau which overlooks Neuilly, and will bring traffic and life into a deserted and unfrequented suburban neighbourhood, which it will be easy to connect with the centre of Paris by means of a railway leaving the Champs Elysées, and passing through the other quarters by the Ceinture line. As for the lawn of Bagatelle, it will certainly be, from a practical point of view, the best place, allowing of easy means of communication, and offering to architects a splendid setting to their buildings. This is the question submitted to the superior Commission appointed by Government, and it is probable that we shall very shortly know the result.

There is also a question of restricting the public from visiting the Salons of the Hôtel de Ville. At present, by some inconceivable carelessness, the Palais Municipal (in spite of the decorative works which are being carried on), is open to all comers. Every day a group of foreigners may be seen going about amongst the scaffolding, either alone or under the direction of a "garden de Bureaux," who for a small sum gives a description of the pictures already finished. We cannot too strongly urge English tourists to be on their guard against these ignorant guides, who will tell them any nonsense, and who are only to be equalled in that way by Cook's ciceroes at the Louvre Museum. Nothing is more edifying than to hear these municipal employes describing as an "Eclipse de Lune" M. Besnard's picture of the "Apothèse des Sciences," in the Salon des Sciences; or pointing gravely to "La Gerolion de la Science," that fine work of M. Lerolle, and describing it as "Science Recompensant M. Pasteur," or yet again showing, in the landscape gallery, views of Paris executed by "pupils of M. Puvis de Chavannes." The bewilderment of those who understand sufficient French, can be imagined, as likewise the upsetting of all their artistic notions. The Administration is awaking to the fact that this ridiculous way of making known to the public the art of the present day, in a place like the Hôtel de Ville, is hardly the thing; and soon guides, who are a little more educated, will be chosen, who will have to give to visitors a plan, with the pictures numbered, the subjects given, and the names of the artists who have painted them. Whilst we are speaking of the Hôtel de Ville, we may mention that the extraordinary ceiling by M. Benjamin Constant, which was exhibited this year at the Salon des Champs Elysées, and which was intended for the great Salle des Fêtes, will not be put in its place. The artist has recognised that in asking him for an important decorative painting the Municipality wished for an example of his best work, and not a rather unfortunate assumption of the style which M. Besnard has brought into fashion. He will therefore recommence the treatment of the same subject in a style based rather on that of the great Italian decorative painters.

The ceiling by M. Aimé Morot, "La Danse à travers les Ages," will undergo some alterations in order to give to the groups a perspective better suited to a ceiling and bring out a little, by some bright lights, the parts which are at present a little too sombre. The putting up of the paintings in the various salons is going on. M. Galland has just put in their place the small subjects in the Renaissance style representing the "Métiers Parisiens." These compositions, which serve to heighten the rather dull effect of the fifteen cupolas of the long gallery adjoining the "Salons à Arcades," are cleverly designed and with a great respect for the architectural lines of the decoration, though perhaps they recall a little too much the style of the compositions made by Schnorr for the Nibelungen legend. We may mention also among the decorations a graceful painting by M. Clairin representing Parisian ladies in summer fashions, a landscape by M. Lapotelet, "Le Pont des Arts," the view of the Pont de

Salferio by M. Billotte, and that of the Luxembourg by M. Harpignies.*

It is difficult to account for the picture by M. Blanchon, who has painted, as a decoration to the Salle des Fêtes, a group of vulgar "ouvriers" in dirty garments, a picture which looks all the more out of place from the contiguity of the allegorical cupola paintings by M.M. Picard and Risler, which are really decorative in effect. M. Pavis de Chavannes has completed his masterly decoration scheme by four esoteric scenes with allegorical paintings of 'The Seasons.' In the adjoining room M. Paul Laurens has completed a new panel representing Étienne Marcel protecting the Dauphin at the moment of the murder of the Marshalls of Champagne and Normandy; a fine and powerfully executed historical painting, though one may reproach the artist with having given a singularly vulgar attitude and bearing to the future King of France. Is this a concession to the democratic prejudices of the Municipal Council?

The Louvre has acquired a splendid set of chessmen in carved ivory, of the twelfth century, presented by M. Stein, and also some curious miniatures by Mureret, given by M. Ch. Nuyter, the archivist of the Opera. The Cluny Museum has received from the Académie des Sciences one of the most remarkable automata of Vaucanson, the famous jointed ass made for the representations of the "Cleopatre" of Marmontel. This little mechanical marvel completes the collection of automata by Vaucanson at the Museum. To the Carnavalet Museum has been added the portrait of Felix Pyat, which was purchased by the Municipality of Paris. The painting is by E. Chantalat.

There is much artistic news at this time of the year. We may however mention the numerous drawings which are being exhibited at the Hôtel Drouot, bearing the well-known names of Forsin, Henri Pille, Willette, &c. There is much talent in these drawings which have been published in the "Echo de Paris." Unfortunately, they are of a kind of art of which there has been a good deal too much in Paris of late years, and against which a formal protest has been made by a society presided over by M. Simon, with the object of putting down "La licence des Rues."

We may mention also the exhibition, at the Georges Petit Gallery, of the conscientious and original nude studies of M. Adolphe Lalire; also the collection of photographs brought by Capitaine Binger and M. Marcel Monnier from their explorations at Ivoire and Kong. This last very interesting exhibition is held at the École des Beaux Arts, under the authority of the Under-Secretary for the Colonies.

Thanks to the addition of the Hôtel de Chimay, the École des Beaux-Arts is now considerably enlarged, and the students have at their disposal eleven new ateliers as well as some large and well-ventilated "loges" for the competitors for the competitions of the School and for the Prix de Rome. Agreeably to the wish expressed by the Prince de Chimay, the façade of the hôtel, which stands at the back of a large courtyard now transformed into a garden, has been left untouched. The garden has been filled with statues, nearly all of which are "envois" from the Villa Medici.

We have to conclude with mentioning the melancholy death of a clever young painter, M. Fernand Blayn, who has committed suicide in a fit of mental distress. M. Blayn was a pupil of Cabanis and of Lerolle. He had obtained an "honourable mention" at the Salon of 1870, a 3rd medal in 1886, and a bronze medal at the 1889 general exhibition. He exhibited two noteworthy pictures at the last Champs de Mars Salon: "Loge d'Artiste" and "Fête à St. Cloud." This sad termination to an apparently promising career has caused great grief to his numerous friends.

CHURCH, NEW TREDEGAR, MONMOUTHSHIRE.—The cornerstone of a new church has just been laid at New Tredegar, by Mrs. J. L. Smith. The church, which is dedicated to St. Diogat, is intended to accommodate 400 persons, with future provision on the south side for a new aisle. It is designed in the Early English style and built of local stone, with terra-cotta dressings. The contract has been entrusted to Messrs. Williams & Sons, of Trefonun, Talgarth, Cardiff, being joint architects.

* This introduction of landscape and architectural pictures as permanent wall decoration appears to us to be very questionable in an æsthetic sense.—Ed.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

Another Scheme of Nine Reservoirs.

FROM the mass of evidences taken at the last sittings* of the Commission, we select for immediate notice that relating to a scheme of proposed storage reservoirs submitted by Mr. Walter Hunter, C.E., Director, and Mr. Alexander Fraser, C.E., Engineer, of the Grand Junction Company. The positions of the reservoirs, nine in number, were shown on a map, and they were indicated by the first nine letters of the alphabet. Four of the sites (northern) are north of Staines, in an angle between the river Colne and the road that runs north-east from Staines to Hounslow parallel with the London and South-Western Railway. Three sites (southern) are on the south side of the main road between Staines and Hampton, and between that road and Laleham and Littleton. The remaining two (western) are in the angle between the Thames and the river Wrayshury. The map showed a proposed intake on the north side of the Thames just above the mouth of the Wrayshury, a conduit crossing that stream and the two branches of the Colne, a pumping-station close to the reservoir A of the northern four, and the conduit continued from A to the three southern reservoirs E, F, and G, and thence to the present works of the water companies at Hampton. The four northern and the three southern sites are in Middlesex, and the two western sites are in Buckinghamshire. These nine reservoirs are on the Thames and near London, while the nine proposed by Messrs. Marten & Rose† are remote from London, are on tributaries, and would feed the Thames itself.

Statements of Messrs. Hunter and Fraser.

The statements on which Mr. Hunter and Mr. Fraser were examined included a number of calculations showing the amount of storage required at the end of each of the ten years up to 1941, providing that the minimum flow over Teddington weir shall be 200,000,000 gallons per day. In a joint report to the Company, they said:—

"Mr. C. J. More, C.E., the Engineer to the Conservators of the River Thames, handed in to the Royal Commission a diagram showing graphically the volume of discharge at Teddington Weir during the years 1882-1891 inclusive, and also showing the quantity of water taken by the Water Companies as given in the monthly reports of the Official Water Examiner. From this diagram, and from tables handed in by Mr. More, it will be seen that the maximum volume of discharge on February 16, 1883, was 9,640,000,000 gallons in twenty-four hours, and the minimum discharge 153,900,000 gallons in twenty-four hours on August 14, 1887. Experience has shown that the minimum discharge of 153,900,000 gallons has not been attended with any harmful results, and it is the opinion of some engineers that all the water coming down the river, with the exception of 5,000,000 gallons per day for the navigation, might be abstracted without detriment. We propose, however, to provide sufficient storage to ensure that, after taking on the quantity required by the Companies, not less than 200,000,000 gallons per day shall pass at Teddington Weir, thus increasing the minimum recorded flow by 46,000,000 gallons per day, or 30 per cent.

Having proved that the Thames will in 1941 be more than equal to the utmost demands likely to be made upon it, the next question to be considered is where this proposed reservoirs should be constructed. It appears to us evident that they must be in some place where they will not only be available in times of short water in the Thames, but would also fulfil the requirements of the Local Government Board, so strongly insisted on by Major-General Scott and Dr. Frankland, viz., that Thames water, when the river is running above its average flow, should be stored in reservoirs before being filtered and distributed. It appears to us that this condition can be best fulfilled, at a reasonable cost, by the construction of the storage reservoirs near the present Thames Works of the water companies.

—We have, therefore, examined the country between Hampton and Staines, and have come to the conclusion that there is ample land of small value in that neighbourhood, and a little

* For reports of previous sittings of the Commission, see last volume of the Builder, pp. 418, 438, 453, 480, 503; and current volume, pp. 10, 23, 47, 71, 82, 103, 126, 204, 316, 333, 353, 375, 396.

† See Builder, pp. 313, 353, 375, ante.

higher up the river, which may be utilised for the purpose. The soil consists of gravel, about 20 ft. thick, resting upon clay, and is, therefore, well suited for the construction of reservoirs, and the beds of gravel and sand above the clay would be admirably adapted for an extensive system of natural filtration, similar to that now in use at Hampton. We have had borings made upon the ground, with the view of bringing direct evidence upon this point before the Royal Commission. The reservoirs would be 40 ft. deep, partly excavated, the soil thus removed forming the banks of the reservoirs, which would be secured by a puddle trench, the inner slopes being lined with concrete. The intakes from the river would be above Staines, thereby avoiding any chances of contamination from that town or from the river Way. The reservoirs would be filled above the river level by pumping, the depth of water being arranged in accordance with the opinion of Dr. Frankland, that Thames water would be improved by storage in deep reservoirs. Conduits would be made to convey the water by gravitation to Hampton, and storage reservoirs would be formed in suitable positions, as shown upon the map accompanying this report. At Hampton the water would be delivered direct into the works of the Grand Junction, West Middlesex, and Southwark and Vauxhall Waterworks Companies; while branch conduits would supply the East London Waterworks Company at Hanworth, and the Chelsea and Lambeth Companies at Molesey. Of course, additional mains and pumping power would be required in the future at each company's works to deliver the water into their districts.

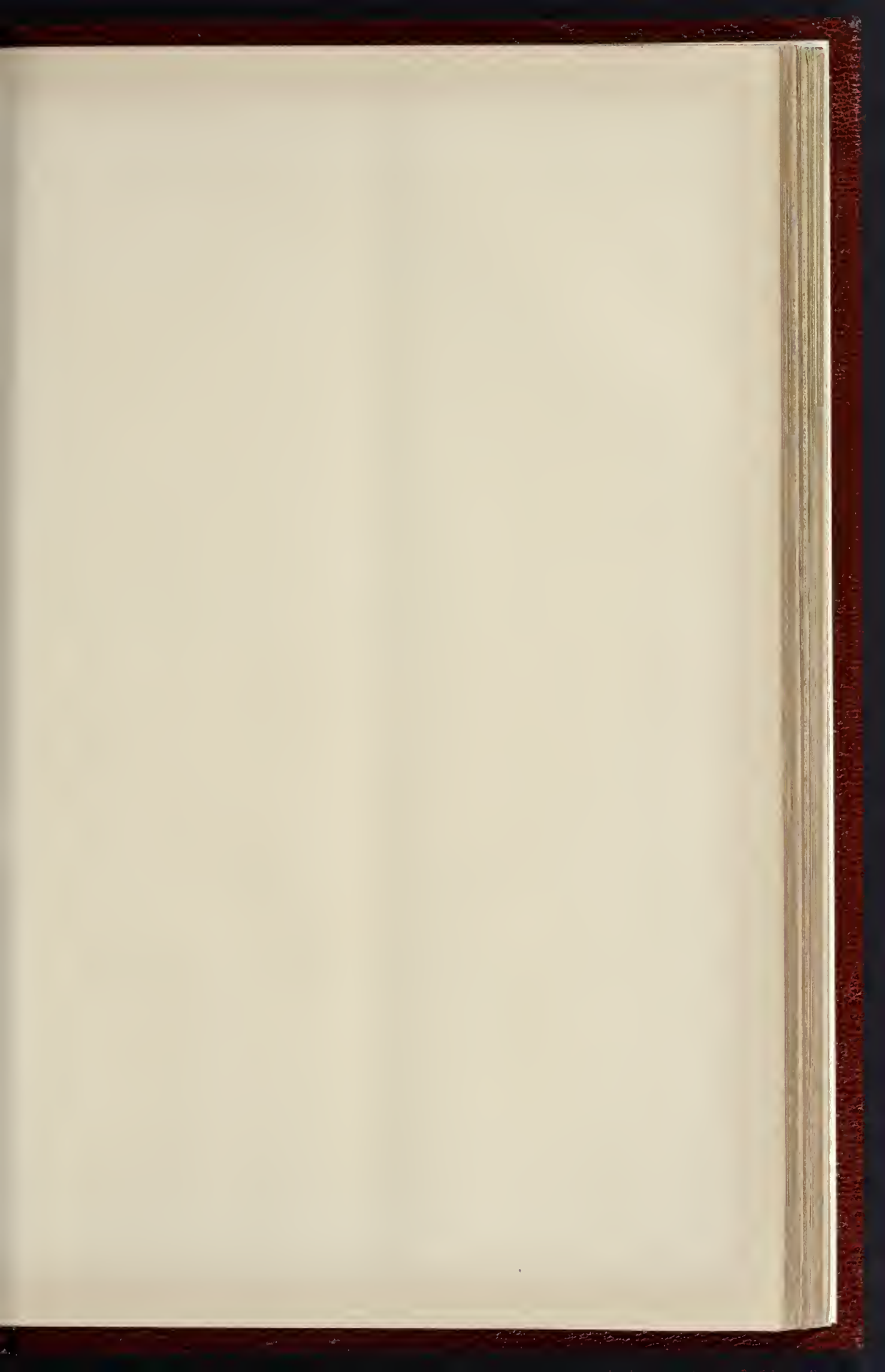
We have, in conjunction with Messrs. John Aird & Sons, looked into the cost of the storage reservoirs, with pipes, conduits, pumping machinery, &c. The cost of each set of works required at the different stations is shown in the following table, the second column showing the total storage required, and the third the storage proposed to be made:—

	1,834 mill. galls.	2,000 mill. galls.	2,990,115
1901	3,200 "	" 2,000 "	363,985
1911	5,054 "	" 2,000 "	736,685
1921	8,485 "	" 4,000 "	725,586
1931	16,520 "	" 8,000 "	1,445,065
Totals	.....	18,000	£4,168,935

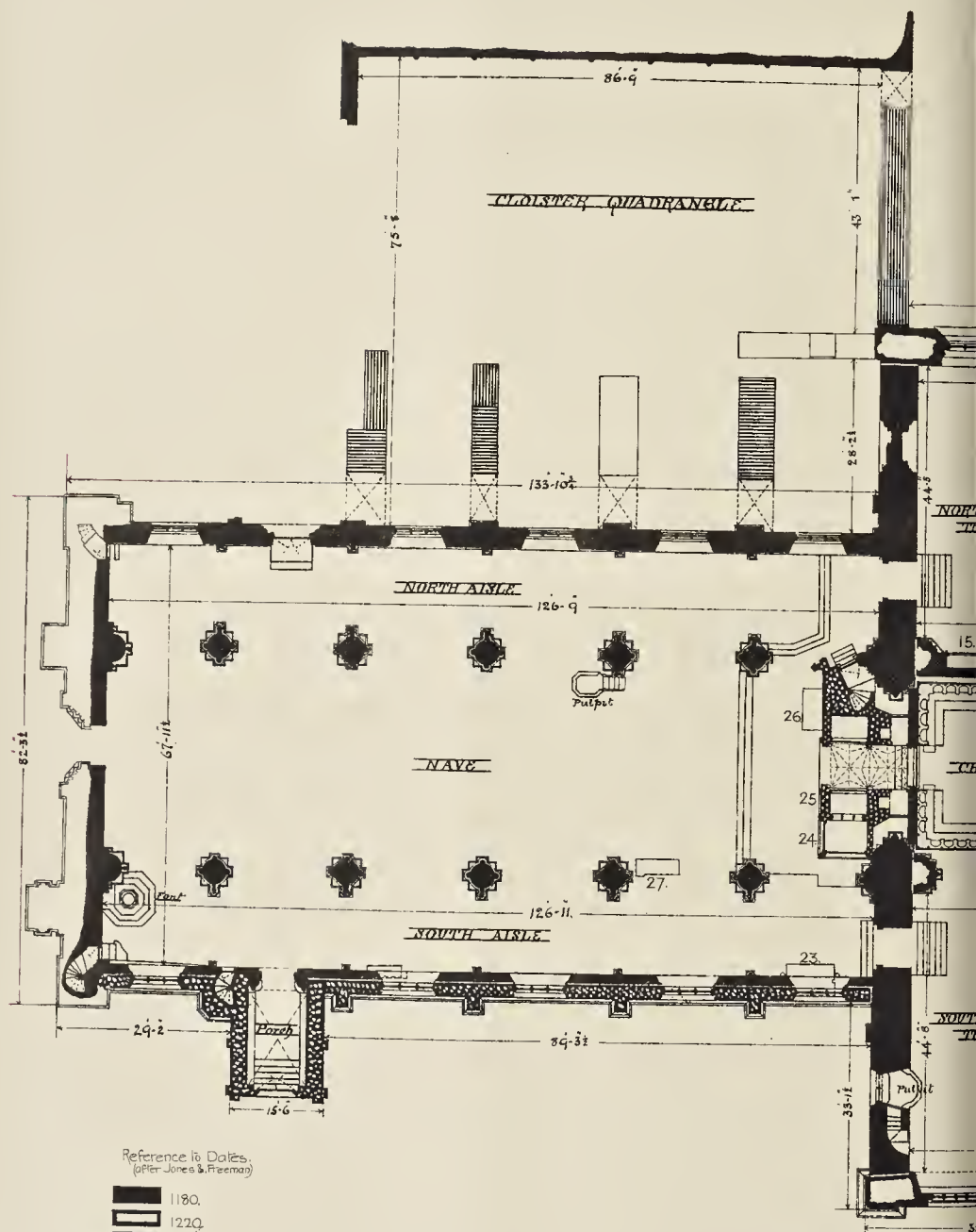
It may be presumed, however, that in any gravitation scheme for bringing water from a distant watershed, no pumping will be necessary for its distribution. It is, therefore, necessary to add to the capital cost of 4,168,935*l.* above arrived at, the cost of the capital sum to be expended in additional pumping power for the distribution, and a sum for the capitalised value, upon a 3½ per cent. basis, or say thirty years' purchase, of the annual pumping charge. The cost of the work as compared with a gravitation scheme will then run out as follows:—









Total expenditure of capital in land, assessments, storage reservoirs, conduits, pumping engines to pump into storage reservoirs, and incidental works	£4,168,935
Total capital cost of 26,940 horse-power to pump water into districts in 1941 at £45, with buildings	1,212,300
Total capital expenditure	5,391,435
Annual pumping charges on 258,000,000 gallons per day, based upon present cost to Waterworks Companies, of £2.50 per million gallons (Lass's Tables) £233,600. As the whole of the power will not be required till the end of the fifty years it will be fair to capitalise only three-fifths of this annual charge. £139,160 capitalised at thirty years' purchase	£4,174,800
Capitalisation of annual charge, three-fifths of £7,580 for pumping into reservoirs at thirty years, £4,548 × 30	136,440
	4,311,240
	£9,792,675

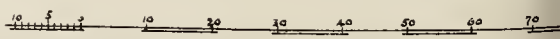
The expenditure of the capital,—and this appears to us to be a great merit of the proposed scheme,—will only have to be made as necessitated by the needs of the growing population, and may be advantageously divided into cycles of ten years, as shown in the tables. In this way capital will only have to be expended when the outlay is justified by the increased demand for water, with a corresponding increase in the amount of water rental. Should, moreover, the future population prove to be over-estimated,



S^t. DAVIDS. CATHEDRAL



- Reference to Dates,
(after Jones & Freeman)
-  1180.
 -  1220.
 -  1248.
 -  1290.
 -  1328-47.
 -  1384.
 -  1461-1522.
 -  Modern & rebuilding.

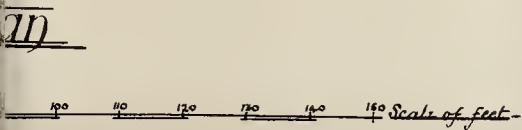
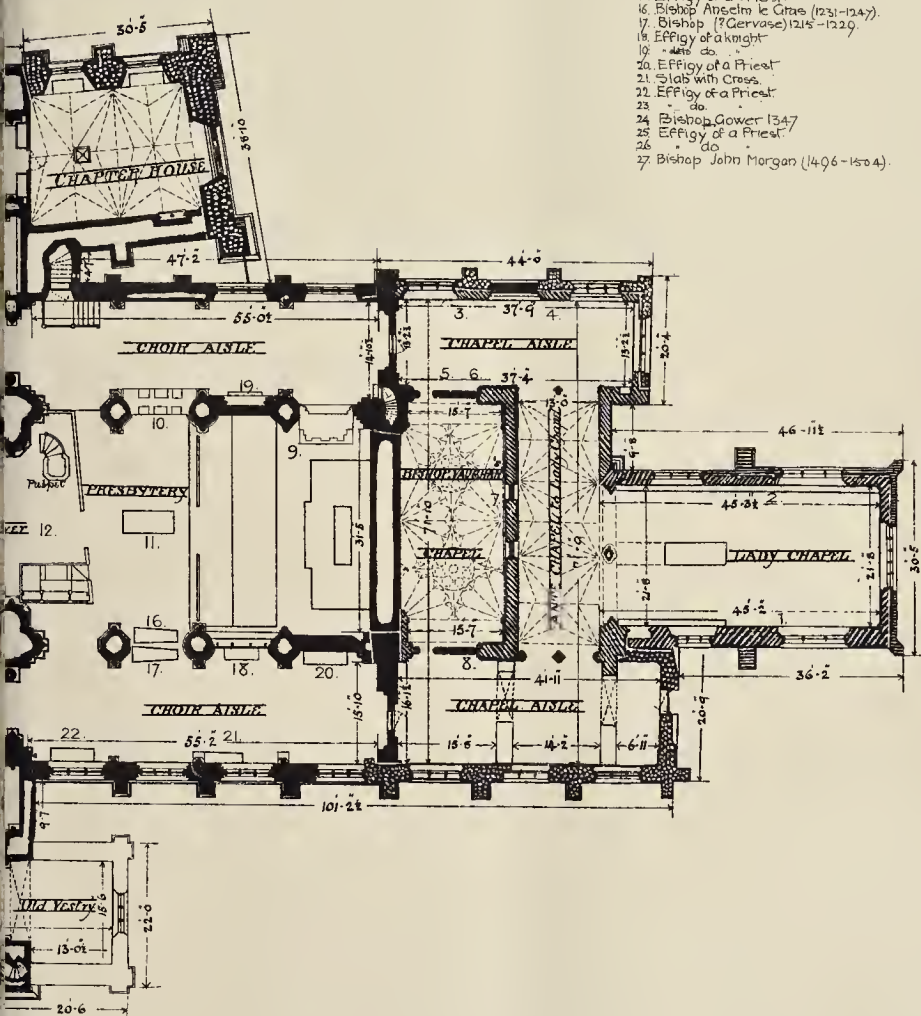


Ground

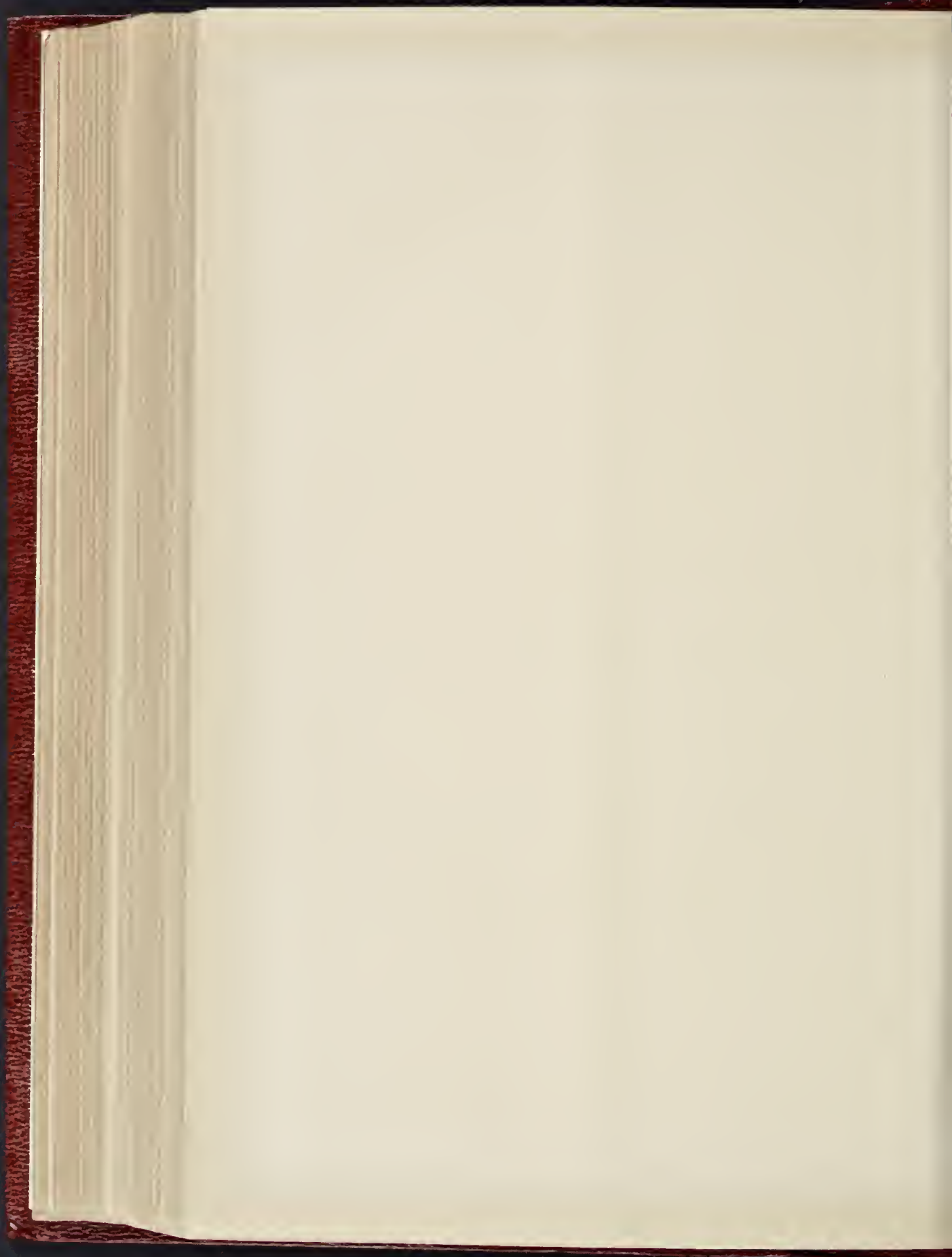
L: S. WALES:

Reference to Monuments, etc.

1. Canopied Tomb (? Bishop David Marlyn)
2. " " (? Bp Beck 1280-93)
3. Effigy of a Knight (? Sir John Wogan or Pictin)
4. " " Priest
5. Archdeacon Hof d. 1419.
6. Fragments of Sculpture.
7. Archbishop Vaughan.
8. Effigy of a Knight.
9. Thos Lloyd, Treasurer 1612.
10. S David's Shrine.
11. Edmund Tudor, Earl of Richmond 1456
12. Slab.
13. " do "
14. Shrine of S Caradoc.
15. Effigy of a Priest.
16. Bishop Anselm le Gras (1231-1247).
17. Bishop (? Gervase) 1215-1229.
18. Effigy of a Knight.
19. " do "
20. Effigy of a Priest.
21. Slab with Cross.
22. Effigy of a Priest.
23. " do "
24. Bishop Gower 1347
25. Effigy of a Priest.
26. " do "
27. Bishop John Morgan (1496-1504).



From Plan lent by
Mr. T. Taylor Scott.



large wasteful expenditure of capital will have been made.

On the other hand, one of the principal objections to any scheme for bringing water from a distant watershed is that the bulk of the expenditure must be made in anticipation of still far distant wants, with the consequence that it would for many years be utterly unremunerative. Sir Frederick Bramwell points out in his evidence that capital expenditure, anticipated by sixty years, increases the cost of works to eight times the amount originally expended.

As before stated, we leave the details of the storage reservoirs necessary to enable the Lea to meet the increased supply of 12,000,000 gallons per day, with which we have credited to the engineers of the New River and East London Water Companies. Presuming that they could be constructed at the same rate per million gallons of daily supply as those we propose for the Thames, their cost would be about 216,000*l.*— $5,391,435*l.* \times 12,000,000 \text{ gallons}$

$300,000,000 \text{ gallons}$
The additional cost of bringing 12,000,000 gallons per day of additional supply from the Thames would be, if taken at the same rate per million gallons of daily supply, as above estimated, 1,800,000*l.*

The above calculations assume, in common with all schemes for a supplemental supply on a distant watershed, that the present works of the companies will be utilised. They will, therefore, always form an important and integral part of the London waterworks system, whether the source of supply be taken from the Thames and Lea basins, from a distant watershed, or from all three of the sources indicated.

Although we have taken Mr. Binnie's estimate of population as the basis of this report, we must not be supposed that we endorse his figures, which represent the extreme views of the unreasonable opponents of the excellent water supply which the natural position of London ensures, at a moderate cost, to its inhabitants. We submit that one great merit of our scheme is that it may be adapted, within the limits set forth, to any increase of population, large or small, which can be reasonably expected for many decades of years to come.

We desire, in concluding this report, to summarise as follows the conclusions at which we have arrived:—

1. That the water obtainable from the Thames and Lea and from wells in the basins of those rivers is good in quality and suitable for the supply of London.
2. (a) That there is a sufficient flow of water in the Thames and Lea basins to provide for the supply of London for the next fifty years, making the estimate of Mr. Binnie as a basis. (b) That the scheme of storage reservoirs near Hampton and Staines, proposed in this report, will provide against drought, will prevent the necessity for drawing water from the river during the first fifteen days of any flood, and will comply with the recommendation so strongly insisted on by the Local Government Board, that the water abstracted when the Thames is running above its average flow shall be stored in deep reservoirs before being distributed. (c) That the works in the shape of storage-reservoirs, pumping-engines, &c., will cost about 5,391,435*l.*, securing a minimum flow of 200,000,000 gallons a day at Teddington, and providing in 1941 300,000,000 gallons a day for water supply, while similar works on the Lea will probably cost about 216,000*l.* (d) That supply carrying out these works the minimum flow of the Thames will be increased by 30 per cent.
3. That the utilisation of the Thames by the scheme of storage reservoirs which we propose will be far less costly than any scheme for bringing water from a distant watershed, and will, therefore, be more advantageous to the public interest.

We submit, therefore, lastly, that while the companies have in the past admirably fulfilled their statutory obligations by giving a good and ample supply of water, they will be able, by the expenditure of a moderate amount of capital, as the necessity for the proposed works rises from the increased demand for water resulting from the growth of the population, to tender in the future equally efficient service to the water consumers of the metropolis."

Approval of Mr. Hawksley and Sir F. Bramwell.

In a supplementary statement Mr. Hunter mentioned that he and Mr. Fraser had been

authorised to lay their report before Mr. Hawksley and Sir F. Bramwell, and these gentlemen had thereupon given the following opinion:—

"We have carefully considered your proposal for increasing, and otherwise improving, the capabilities of the River Thames for the supply of the metropolis and its vicinity, when and as may be wanted at any time or times during the ensuing fifty years, and we are pleased to have the opportunity of stating that we approve in general terms of that proposal.

As to the quality of the water, we think you are fully justified in relying on the evidence of the cited chemists.

With respect to the capability of the Thames, when aided by the suggested storage reservoirs, to afford a supply of 300,000,000 gallons *per diem* for waterworks purposes, while leaving a minimum of 200,000,000 gallons per day to flow over Teddington Weir, we have no doubt that these quantities can be obtained by the suggested means, but we are of opinion that so large a quantity as 300,000,000 gallons per day for waterworks purposes will not be required, even at the end of fifty years.

We think that if the water of the Thames be derived and stored as proposed, and be afterwards filtered in the usual manner, it will be improved, and will be free from any stain due to floods, and we are further of opinion that no sensible deterioration of its quality would occur; even if flood water were occasionally pumped into the reservoirs, it would settle and leach.

With regard to the proposition to bring the suggested 210,000,000 gallons *per diem* supplemental water from Wales, we are of opinion that it would not be feasible to do this by means of an open channel; and farther, we are of opinion that such supply would certainly involve an outlay of at least 30,000,000*l.*

In conclusion, we beg leave to express our opinion that the sites proposed for the reservoirs are suitable for their intended purpose, and that the reservoirs are capable of being constructed at a moderate expense; and we think that this project may very properly be placed before the Commission as one, amongst others, to show that the watershed of the Thames affords ample facilities for increasing the supplies of water to the metropolis, when and as they may be required; and we will willingly support this view by our oral evidence, if your Board, on further reflection, see fit to call upon us for that purpose."

Mr. Hunter's Evidence.

Mr. Hunter said that he was struck with the small percentage of water taken from the Thames in comparison with that abstracted from the Lea, while the greater abstraction from the Lea does not interfere with the navigation or prejudice people living on the banks. This fortified him in the opinion that there is plenty of water in the two valleys to supply the needs of London for many years. He thought it desirable to enjoin to the Commission a definite scheme of storage reservoirs, and therefore Mr. Fraser and he had prepared this scheme. The proposal was that the water should be taken at Staines, and the reservoirs constructed as they were required. The reservoirs would be 40 ft. in depth. The water would flow in by gravitation to the lowest 10 ft., and the rest would have to be pumped. The gravel bed varied in depth from 10 ft. to 25 ft. before the clay was reached, and it was proposed to carry the trenches into the clay. It might be a little troublesome, on account of the water in the gravel, but it could be done. The estimates had been worked out in conjunction with Messrs. Aird & Sons. The conduit was proposed to be placed in the clay itself. The worst flood-water would be allowed to pass. Storage was provided for four months of drought and fifteen days of flood. The estimates before the Commission showed that 153,000,000 gallons a day were expected to be obtained from the Lea Valley (river and wells) and the Kent wells. Assuming the total supply required to be 433,000,000 gallons, 153,000,000 from the Lea and wells would leave 280,000,000 to be taken from the Thames. That was on the assumption (as Mr. Hill remarked) that all the water expected would be got from the Lea and the wells; but he had not included what geologists said could be got from the chalk. As to the effect upon the Lea district of pumping a larger quantity, he was not prepared to express a definite opinion; but he did not think that what was proposed to be taken would have a great effect upon the river supply.

Sir A. Gellie: Supposing that these reservoirs which you have sketched on the plan are constructed, what do you imagine will be the effect; will there be any effect on the flow of the Thames; what effect do you suppose they would have?—They will not have any special effect upon the flow of the Thames. We shall allow always the 200,000,000 gallons to go down the River which the Thames Conservancy wish to have according to their instructions issued to Messrs. Marten & Rofe. Beyond that I do not see that it would have any special effect at all.

You think that even that quantity might be produced without injuring the traffic in the river?—I think so.

Mr. Mansergh: You have never heard of any complaints as to the water that has been pumped from the Lea Valley affecting the navigation, I understand. Is that what you meant to understand?—I have never heard of any complaint.

You never heard that the companies were pumping so much water as to deplete the navigation?—I have heard this: I have heard the Lea Conservancy say that they have had to do more dredging down the river in the lower reaches of the navigation owing to the fact of the companies taking so much water out.

That is so?—Yes, that is so.

Mr. Fraser's Evidence.

Mr. Alexander Fraser, who had given evidence at an early stage of the inquiry, was re-called and examined on this scheme.

Sir A. Gellie: Would you kindly tell us the conditions under which you proposed this series of reservoirs?—Mr. Hunter, I think, has told you what led up to it. I was instructed by my Board to assist him in drawing up this report, to look at the ground, get borings, and so on, and put it into a practical shape, which I attempted to do.

Would you tell us generally what is the depth of gravel over that ground?—The depth of gravel varies. There are 20 ft. to 24 ft. of ballast and sand, generally speaking, all over that area, and the bottom is London clay.

Mr. Mansergh: Does that apply to all the sites of reservoirs that are on that plan?—Yes. Of course, there are many other sites equally available, but we selected those as convenient. They happened to be without any roads or houses upon them; they seemed to be singularly well adapted.

Sir A. Gellie: Do you propose to dig down to the clay in these reservoirs?—We should dig down to the clay, as shown on the section there, and bring up a puddle wall.

The puddle-wall is in the clay, but what about the floor of the reservoir?—We should excavate the ballast, make up the bank, and that is all we should do; we should not floor the reservoir with anything, but leave the ballast. We have done that at Hampton. We have made, I should think, a mile of puddle-trench there, through that same ballast, in some cases 40 ft. deep. Of course, the deeper you are, as you are aware, the more trouble and expense; but still it is just a question of pumping in short lengths, and keeping the water out while you get this in. That is the way we have made our reservoirs at Hampton.

Mr. Hill: I suppose in the large area of these reservoirs you only want material to make your embankments?—That is all.

Here it is represented at about 6 ft. in depth?—It is about 10 ft.

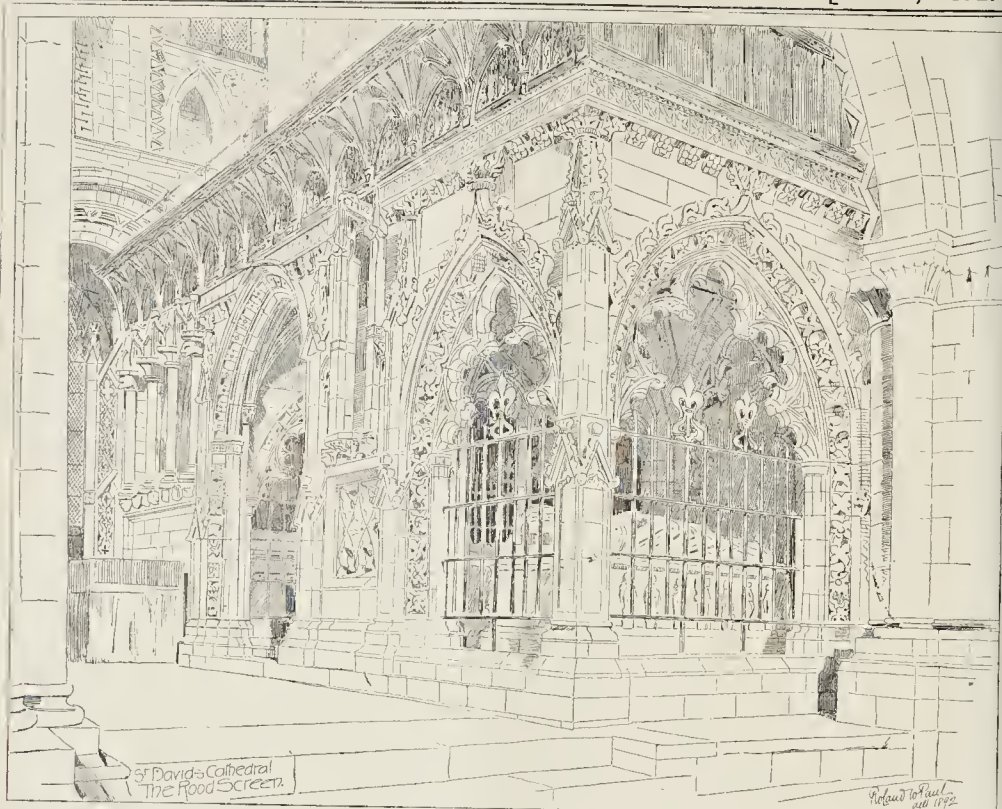
Will that give you all the material you require for your embankment?—Yes.

Of course the bottom of the reservoir you need not do anything to?—Nothing.

It is a gravel bottom?—Yes.

The sides I suppose, down to a point, you can protect with concrete?—Yes, to meet the effect of the wind,—against the wind. Each reservoir of water covers 200 acres and is 40 ft. deep, and that represents 2,000,000,000 gallons. It is proposed to make them in alphabetical order,—first of all to make an Intake; it is thought desirable to go above Staines while we are about it to bring it down to Hampton, that is seven miles,—by the river it is about five miles more. If you have a pumping-station there and make Reservoir A and pump into that, and then pump into the next one B, and so on, when they are all down the water could flow through the whole lot of them, any series of them, or through any of them, down into the culvert, and so keep moving, if necessary.

[Continued on p. 442.]



Illustrations.

ST. DAVID'S CATHEDRAL.*

THE old saying that two pilgrimages to St. David's were equal to one to Rome is still, though in a different sense, of some extent true. This, by far the most important of the Welsh cathedrals, is the most difficult of approach, and is the only Cathedral in England or Wales that is still without direct communication by railway with the outer world, and its isolation gives an additional charm to its surroundings, which are naturally wild and extremely picturesque. The Cathedral itself is situated on low ground, in the narrow valley of the River Alan, which flows within a few yards of the west front, and passes to the sea about a mile and a half distant. The high ground rises on the south and east sides, and, to some extent, on the north, and provides that shelter which was, no doubt, the chief idea in the minds of the founders in choosing the site. The most effective views of the building are from this high ground eastward, embracing not only the Cathedral, but St. Mary's College on its north side, and the grand ruin of Bishop Gower's Palace beyond the Alan on the west. The tower and gable of St. Mary's College appear on the right hand of the view here given; from this point, however, the Palace is invisible, being hidden by St. Mary's College and the foliage about it.

The Cathedral, a building with a total length of slightly over 300 ft., is a cruciform structure with a central tower, and it retains examples of nearly every period of architecture from the time of its commencement by Bishop Peter de Leia in the latter part of the twelfth century (1176-1198) to the present time. The stone used came largely from Caerfal, not far distant, on the coast, and the material for the recent restorations has been obtained from the same neighbourhood, although the more recent

* This series of illustrations of the Cathedrals of England and Wales was begun in our issue of January 3, 1891. A list of those already illustrated, with particulars of future arrangements will be found on page 450.

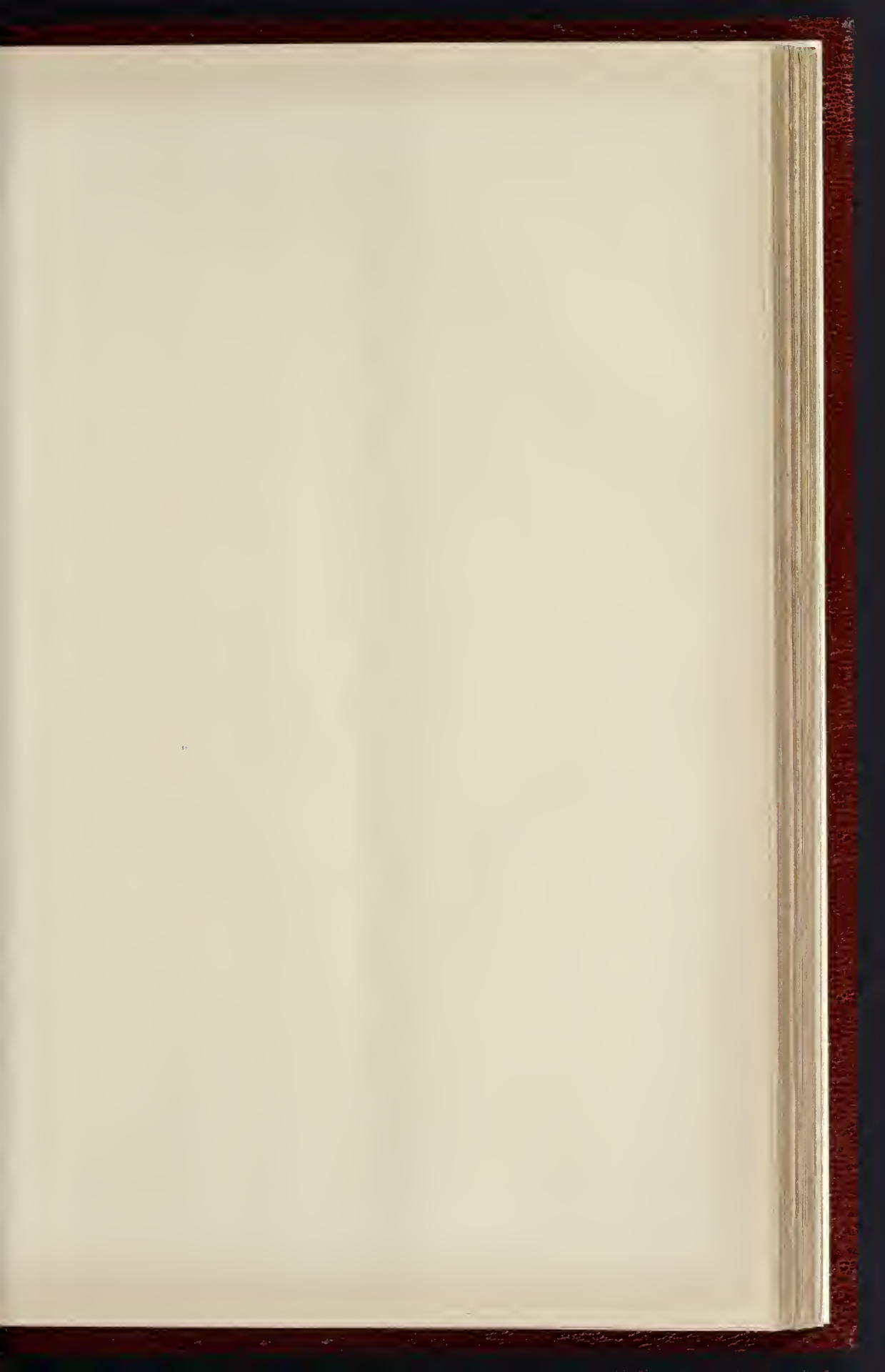
stone is not of the same colour as the old. With its rugged surroundings it is not surprising that the exterior of the fabric shows little attempt at ornamentation. Beyond the tracery of the Decorated windows in the aisles, one or two Perpendicular ones, and the parapet and canopied niches of the tower, all the external features have been kept as plain as possible. The only portion of the fabric which has been rebuilt to any considerable extent is the outer portion of the west front, a restoration by the late Sir Gilbert Scott, which took the place of the west front erected by Nash at the end of the last century at a time when the Cathedral must have been in a very dilapidated condition. The Lady Chapel and the aisles flanking what is known as Bishop Vaughan's Chapel are, as will be seen on reference to the view, still roofless. The window tracery of these parts of the building is modern, their design having been, to some extent, recovered from fragments found *in situ*. The central tower piers, being in a dangerous condition, were underpinned and largely rebuilt and restored with the old material by Sir Gilbert Scott, with success. The tower is of more than one date, the first stage clear of the roofs being Decorated, and part of Bishop Gower's building. This in turn has had a Perpendicular helical stage of Bishop Vaughan's time added, with an open parapet, and angle and intermediate pinnacles. A prominent feature in the eastern views of the church is the three-storied building projecting eastward from the north transept, the lower portion being formerly the Chapel of St. Thomas of Canterbury, and the upper the Chapter-house. The Chapter-house now occupies the portion on the ground level. The upper stories are approached by a stair from the north aisle of the Presbytery. A smaller chapel, now used as a vestry, projects from the corresponding wall of the south transept, and was rebuilt at the time of the last restoration. The only other portions of the building which break the main lines of the exterior are the south porch, at the second bay eastward of the nave, and the buttresses,—some modern, others dating back to the fifteenth

century,—which support the north side of the nave, and encroach on the cloister court still existing in the space between the church and the College of St. Mary.

In strong contrast with the simplicity of the exterior is the richness of the interior. From the work of De Leia to that of Bishop Vaughan every effort seems to have been made to render the interior of the Cathedral a fitting and imposing setting for the shrine of St. David which it contained—the great patron saint of the Welsh Principality. Of the early church preceding De Leia's reconstruction we have no trace, but there is good reason to believe that the original site of the first church was retained. The western piers of the tower, the west wall of the transepts, and the whole of the nave with the exception of its outer southern casing, the porch, and the inner portion of the west front, are of De Leia's date. The arcade is of six bays of wide span, circular arches rising from alternately octagonal and circular piers, having semi-attached shafts at the cardinal points. Over the arcade, and divided from it by a bold string-course, is the upper stage of the design, which includes the clearstory and triforium under an enclosing arch. The triforium consists of two pointed arches with a circle between them, the clearstory windows having been simple round-headed lancets now in some cases filled in with later tracery.

All the work is Transitional in character, combining the solidity of the Norman with the pointed arch of the thirteenth century. Ornament has been lavishly bestowed wherever possible, and the main arches, and the smaller ones above them, are full of rich detail characteristic of the style and date. Over all is the late roof, with elaborately-carved pendants dating from the time of Owen Pole, treasurer, 1472-1509. The whole may take rank as one of the most striking and elaborate interiors in the kingdom.

The aisles were raised in Decorated times, and some of the windows are of this date,—others are modern copies. The aisles have wooden roofs, although vaulting shafts remain against the outer walls.



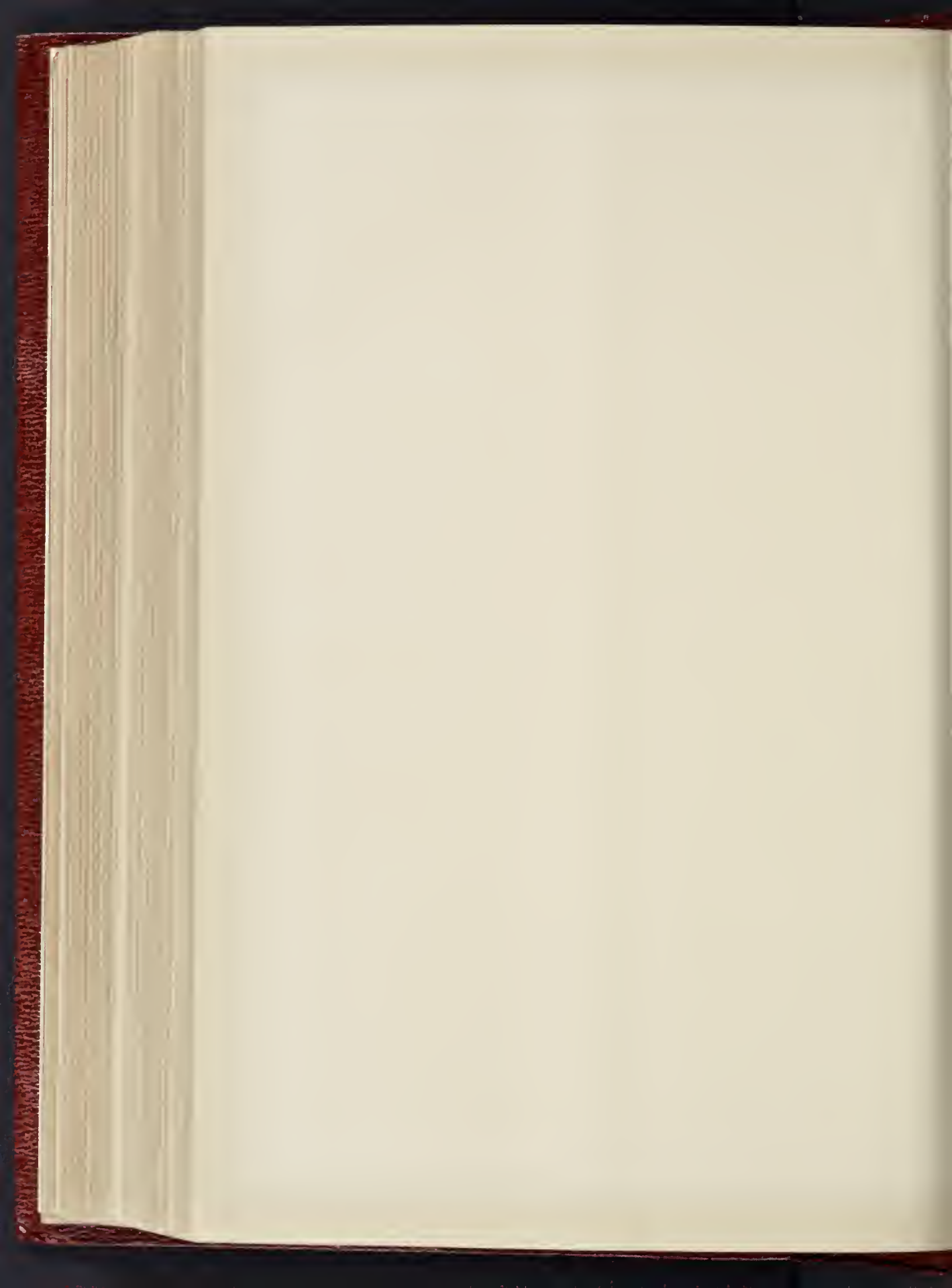


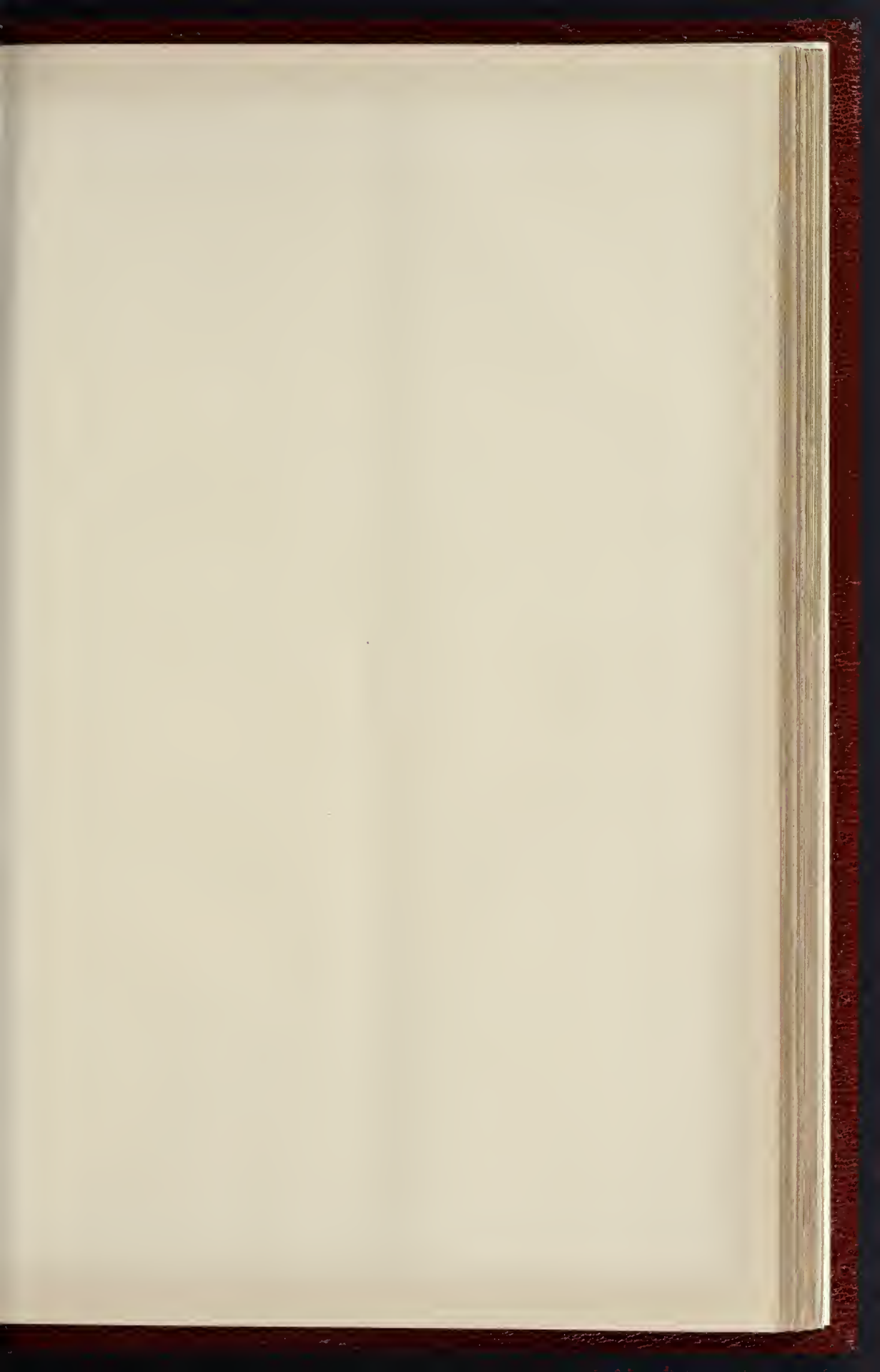
ST DAVID'S THE CATHEDRAL FROM
FROM A WATERCOLOR



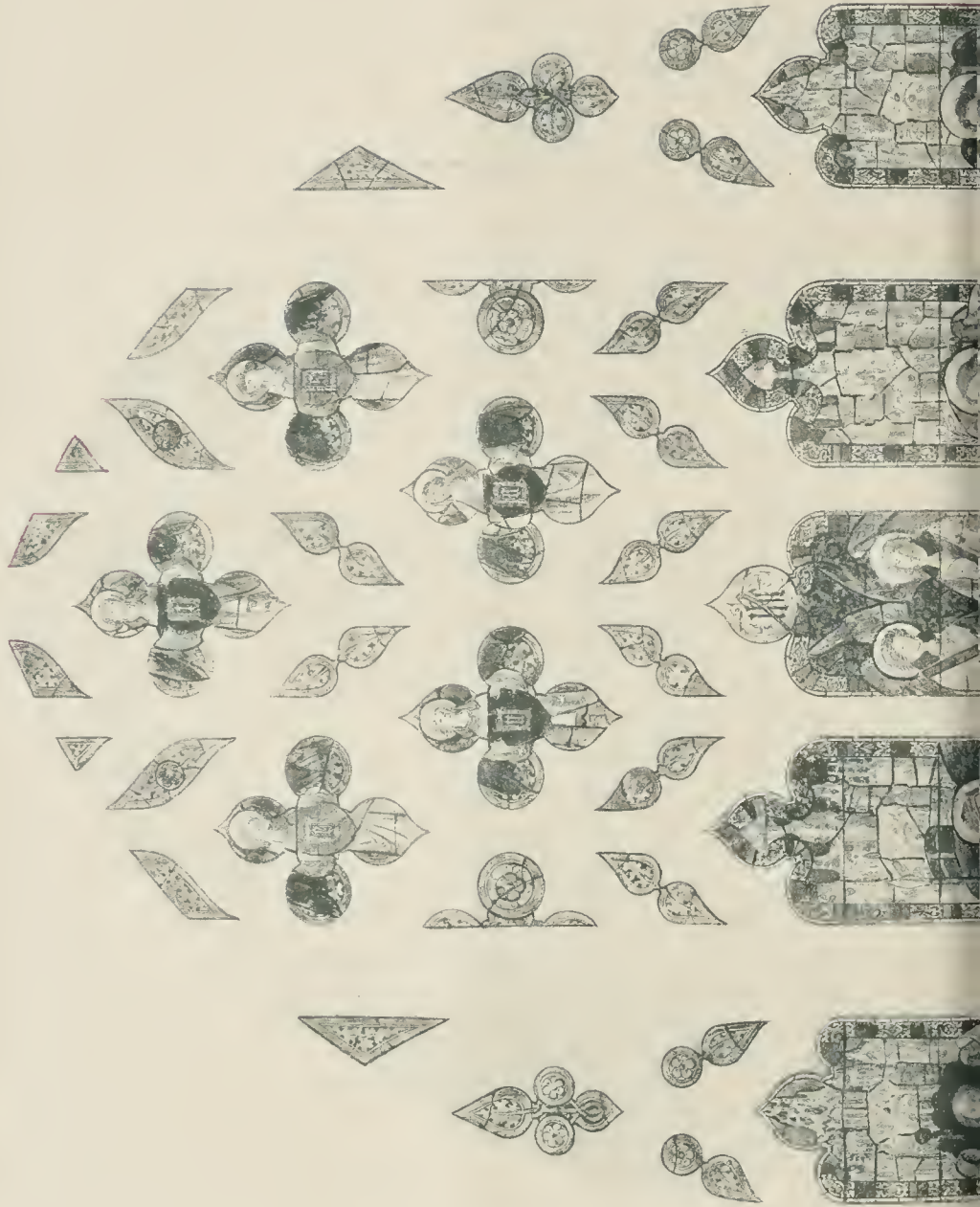
YARD OF THE BISHOP'S PALACE

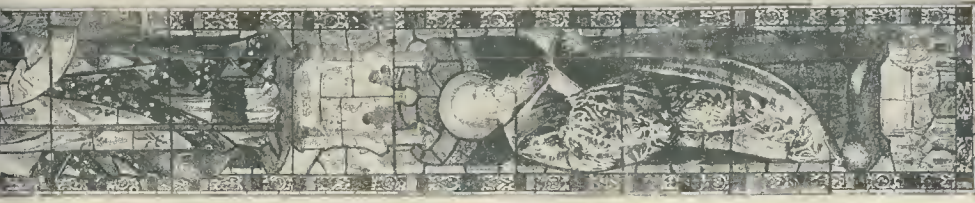
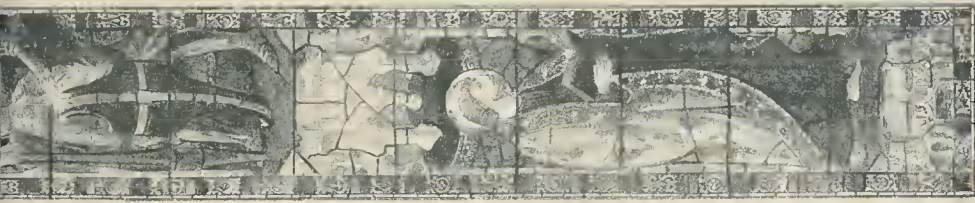
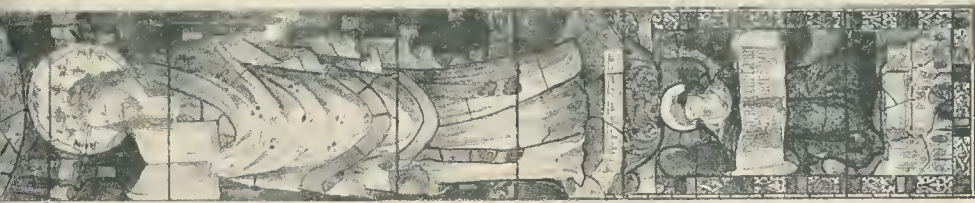
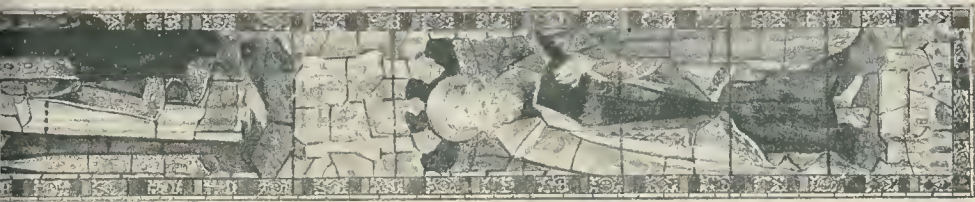
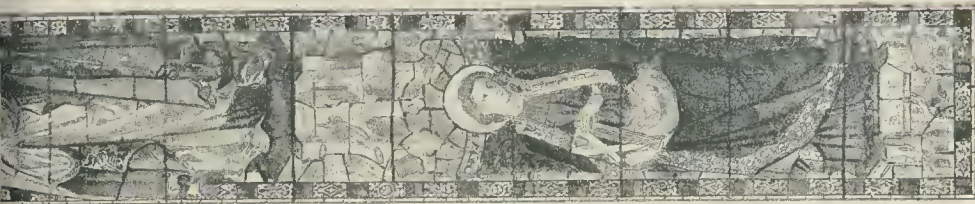
T. G. JACKSON, A.R.A.





THE BUILDER, DECEMBER 3, 1892

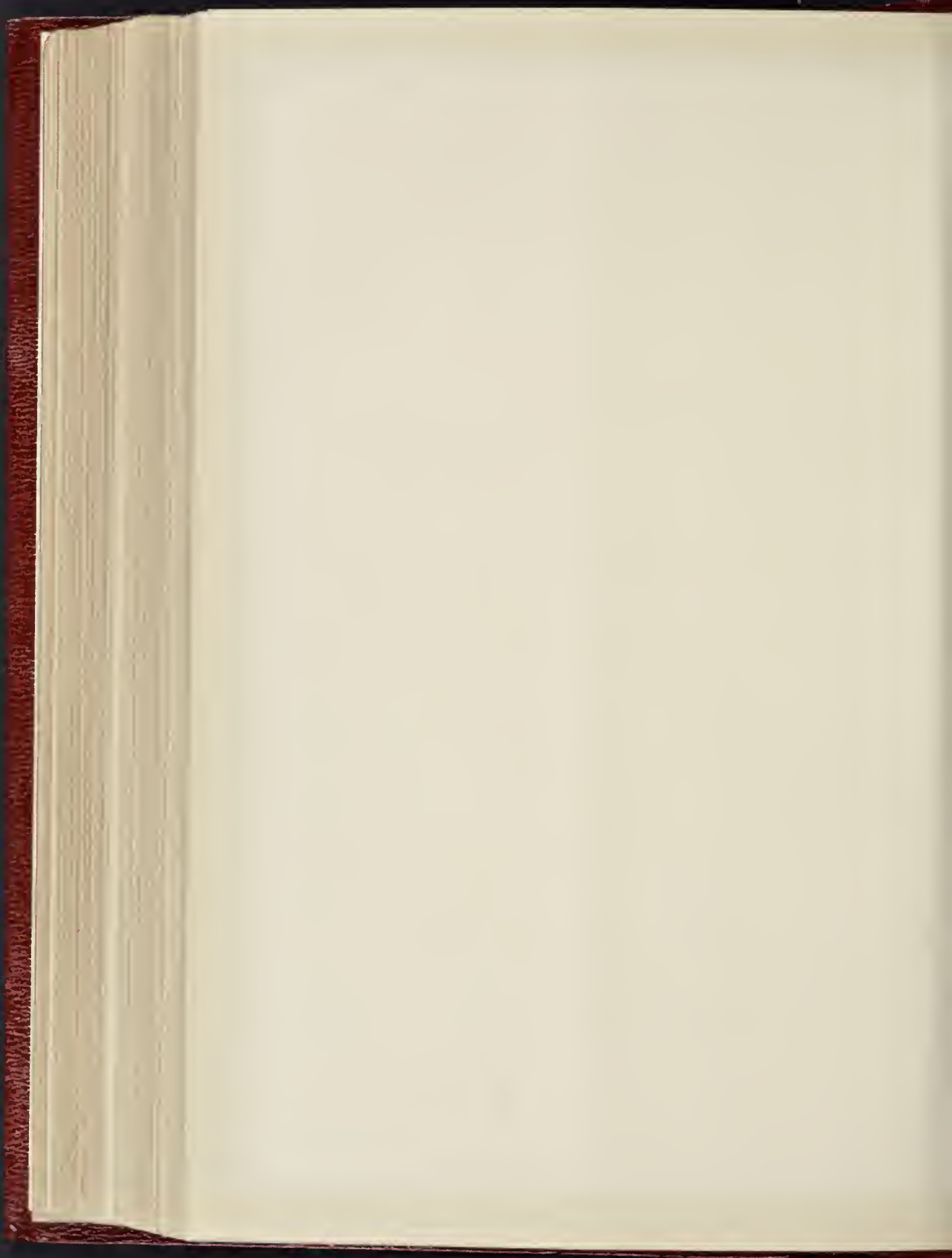


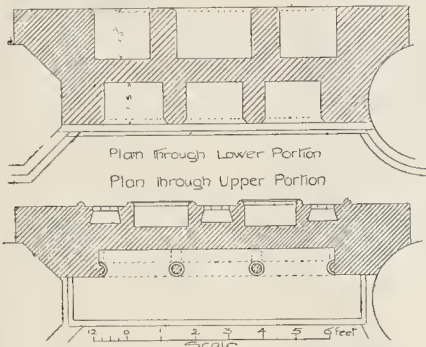
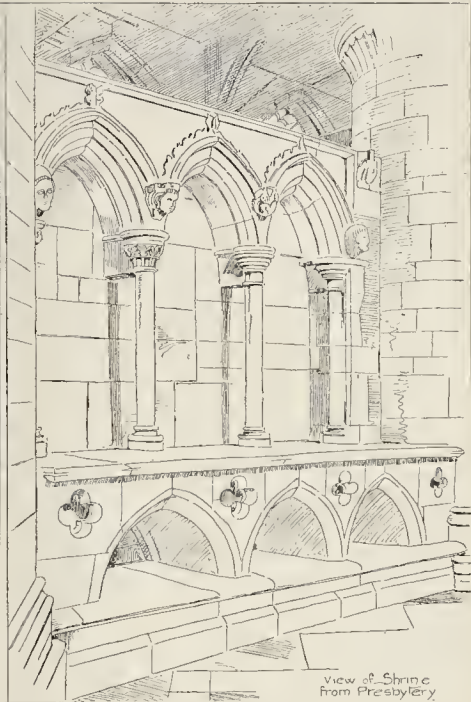


THE PHOTO ENGRAVING BY F. & C. 48, 51 EAST IMPERIA STREET, LONDON, E.C.

EAST WINDOW, SKELTON-IN-CLEVELAND CHURCH, YORKSHIRE.—BY MESSRS. SHRIGLEY & HUNT

Royal Academy, Exhibition, 1892

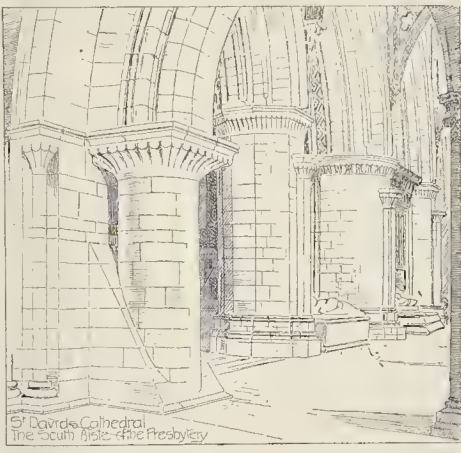




St David's Cathedral
The Shrine of
Saint David
on the north side
of the Presbytery



The portion of the church east of the nave is considerably raised above it. In addition to the steps, the whole of the nave floor slopes up gradually eastward, and by this means full advantage is taken of the natural slope of the ground to give extra dignity to the interior. At the last pair of main piers eastward are three steps to the platform, which stretches across the nave in front of Bishop Gower's rood screen, a very beautiful specimen of fourteenth-century work, rich in its details, but with a judicious use of plain wall-space giving a reserve and dignity to the whole. Practically it is divided into three sections. In the centre is a doorway which leads through a vaulted vestibule to the choir. On the north side is a range of canopied niches, apparently earlier work re-used, forming a rearedos to the altar of (?) St. John. At the extreme southern end is the tomb of the bishop, Gower (1328-1347), during whose episcopacy the screen was erected. It consists of a recumbent effigy on a tomb surrounded by small figures on pedestals attached to its side, the whole enclosed in a vaulted space, having richly cusped arches on the west and south sides, with grilles. On either side of the main entrance flanking the first bay of the vestibule are two other recumbent effigies of priests.* The staircase to the loft is entered at the north-west angle of the screen (see plan). Over the screen is a wooden cornice and cove, restored from fragments of the vaulted cove which were in existence. At present the organ occupies the space over the screen. The general design will be more clearly understood



by reference to the illustration at the head of this article. Five more steps lead from the screen platform to the choir, giving a total of eight in all from the nave level. The choir stalls are arranged under the tower, and returned against the back of the rood-screen. They are of fifteenth-century date (Bishop Tully 1460-1480), and

have misereres, quaintly carved. There is a bishop's throne, of wood, on the south side, and to all appearance a mixture of fourteenth and fifteenth-century work—portions, doubtless, of earlier fittings of Gower's period, to which also the unique parolose screen which encloses the choir proper, and divides it from the Presbytery, belongs. The central tower which formed

* The No. 26 on the plan has been placed in error opposite the Altar of St. John, instead of being opposite the tomb on the north side of the entrance, corresponding with 25.

part of De Leia's building, fell, like others of its date, either from bad foundation or bad construction—probably from both causes. It fell eastward and laid the Presbytery in ruins and this largely accounts for the curious points which are observable in the present Presbytery. While some of the details,—notably the caps of the arcade,—are early in character, a marked advance in the style is shown in the arches which are pointed, and in the lancets (one in each bay) of the clearstory. No doubt, as was generally the case, old material was largely re-used and worked up in the new design. As will be seen by the sketch of the interior of the Presbytery aisle, the level of the large caps and that of the aisle vaulting shafts differ considerably, the former being raised above the latter. Agreeing in height with these vaulting shafts attached to the presbytery piers is a semicircular arch in the east wall of the aisle, showing the level of the vaulting of, presumably, De Leia's Church. The vaulting shafts of the aisles (against the outer wall) are again higher than the main arcade, pointing to the fact that the vaulting of the aisle as rebuilt in the thirteenth century was intended to spring from corbels above the junction of the label of the arcade, disregarding entirely the existence of the earlier shafts against the pier. The aisles are, however, at present covered in with modern lean-to roofs, and it is a matter of conjecture how far the project of vaulting the aisles was carried out. The east wall of the Presbytery was pierced by three very fine lancets, their heads reaching nearly to the level of the apex of the clearstory lancets. The space between these and the roof was, and is still, filled by a row of four shorter lancets (which show over the Vaughan Chapel in the exterior view). Only these upper ones, which are restorations by the late Sir G. G. Scott, are at present glazed, the lower ones being filled by mosaic (placed there within recent years) for reasons which we shall explain later. At present the Presbytery is covered by a perpendicular panelled roof of slightly earlier date than that of the nave. It has been richly decorated, as far as could be done on the old lines, and contains a number of shields of arms of persons connected with the fabric.

On the north side of the Presbytery, under the second arch east of the central tower, is what is known as the Shrine of St. David. It may be described as an oblong structure, 3 ft. 6 in. in depth, and with a frontage of nearly 12 ft. towards the Presbytery aisle. The upper portion of the front facing the Presbytery is arcaded, and below are three pointed arches springing at the floor level, and having recesses 1 ft. 3 in. in depth. On the north front, facing the aisle, the design is of a far simpler character, the plain wall being merely pierced by apertures of various forms,—those below being three with semicircular heads, others above them quatrefoils, and these latter having between them two shallow oblong recesses, round which a string moulding is carried. The whole has a plain mould round the top, and carried the shrine proper. It seems, perhaps, curious that the shrine of so celebrated a saint as St. David should not have been of more elaborate workmanship, bearing in mind the elaborate erections of St. Albans, Chester, and Christ Church, Oxford. We have the authority of Browne Willis that the back of the arcading on the Presbytery side was decorated with figures of SS. David, Denis, and Patrick. In its present condition, however, but a poor idea can be obtained of its original beauty. There are many other monuments of interest in the aisles of the Presbytery. On the north side (east of the shrine) is a knight in a heraldic *jeupon*. In the south aisle is a similar effigy, two figures of Bishops side by side, two or three effigies of priests, and a collection of slabs with crosses and semi-effigies brought here for safety from the ruined portions of the church. In the north transept, under the north arch of the central tower, and back to back with the stalls, is what is known as the shrine of St. Cadoc, a simple stone structure with a projecting upper portion, and having recessed apertures similar to those on the shrine of St. David, already described.

That portion of the church east of the Presbytery is one of the most curious points in the planning of the Cathedral. The aisles, instead of being returned round the east end of the Presbytery, were carried a sufficient distance eastward to allow a space of 15 ft. (from east to west) east of the Presbytery wall.

There seems to have been a desire to retain the glazing of the lower lancets. A connecting aisle was built, and formed the ante-chapel to the Lady Chapel, which projected again eastward, and completed the fabric in that direction. Much of this portion is Early English, transformed in places by Gower's alterations in Decorated times. The Lady Chapel itself was built in the time of Bishop Martyn (1290—1328), and received additions also from Bishop Gower.

The last structural addition to the Cathedral was the construction by Bishop Vaughan (1509-1522) of his chapel east of the Presbytery, and occupying what is presumed to have been up to that date an open space. The chapel was elaborately vaulted with the fan tracery of the period, and the lancets were, and still remain, walled up. Hence the somewhat unusual appearance of the east end of the Presbytery seen from the west.

Under these lancets, and facing towards the later chapel, was discovered a recess, partly filled with bones, and the hack ornamented with crosses of various patterns, the central one being pierced the entire thickness of the wall. Its use has not been satisfactorily explained, but it seems to have been undoubtedly used at some period as a squint or hagiostope. Bishop Vaughan's Chapel and the ante-chapel eastward are the only portions of the church, east of the Presbytery, which are covered in. The side aisles flanking them, and likewise the Lady Chapel itself, are still in a semi-ruinous state,



although within the past year or so the tracery in the windows has been restored. There are several fragments and monuments scattered about in different parts of this portion of the building, but all have suffered much from the weather. In the south aisle, built into the modern cross walls, are some old shields, apparently bosses, one charged with the arms of the See (see illustration). In the Chapel of St. Thomas of Canterbury (now the Chapter-house) is a case containing some fine specimens of pastoral staves and rings found during the restoration.

North of the nave are the ruins of St. Mary's College, with its tall tower and domestic buildings. West of the Cathedral is the magnificent ruined Palace of Bishop Gower,—a prelate who did so much, both to the fabric of the Cathedral, and to other buildings in this part of Wales,—Swansea Castle, church, and another episcopal palace at Lamphey, near Pembroke, besides other smaller works. The arcading, which is so characteristic of his work, is to be seen here in good preservation, and amongst other details is a beautiful rose window, or "marigold," at the end of the great hall.

The close wall which surrounded both the Cathedral and Palace, and other buildings connected with the fabric, remains in places, and a very curious two-storied octagonal building, attached to the eastern gate of the close, still remains, and is seen at the extreme left hand of the general view. It has been suggested that it formed a detached campanile during

the period before the rebuilding of the central tower.

The plan which we give to-day has been taken from one kindly lent us by Mr. T. Taylor Scott of Carlisle, to which we have made certain additions to bring the plan, which was made a few years ago, up to date.

ST. DAVID'S: THE CATHEDRAL AND PALACE.

THIS view, from a water-colour drawing by Mr. T. G. Jackson, A.R.A., has been taken from the rising ground on the northern side of the great courtyard of the Bishop's Palace erected by Bishop Gower. The portions of the Palace shown in the view comprise the entrance gateway (in the centre of the picture) and a portion of the main building which forms the east, on more strictly speaking, the south-east, front of the Palace, connected at its southern end with the range of buildings formed by the Great Hall and the Chapel. Behind the ruins rises the central tower of the Cathedral, and on the extreme left the smaller tower of St. Mary's College.

Knowing that Mr. Jackson had been making a portfolio of sketches at and about St. David's recently, we begged him to add one of these to our more formal illustrations of the plan and architecture of the Cathedral, and owe him our best thanks for his ready compliance with our request.

EAST WINDOW, SKELTON-IN-CLEVELAND LAND CHURCH, YORKSHIRE.

THIS window, the drawing of which was exhibited at the Royal Academy this year, was executed by Messrs. Shrigley & Hunt for their above-named church, near Salburn-by-the-Sea. In the centre light, forming the keystone of the composition, is a figure of our Lord in Majesty, holding an open book as the revealed Word. The side lights contain two tiers of figures, the lower the four Evangelists, the exponents of the Word on earth, and in the upper tier the four Archangels, the superiors of the heavenly hierarchy. Below the figure of our Lord is a kneeling angel with a scroll inscribed, "Heaven and earth are full of the majesty of thy glory," and above the figure are two angels in adoration. In the five principal quatrefoils of the tracery are angels bearing shields, each charged with a letter of the sacred name. The window is exceedingly simple in its colouring, and silvery in tone throughout.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

(Continued from page 439.)

Mr. Hill: What would be the level of the top-water of the reservoirs as compared with the level of the water in the river at about the quantity that you would be taking?—The water in the river above Bell Weir Lock is 50 ft. above datum.

Mr. Mansergh: At summer level?—At summer level it is 50 ft.; 30 ft. higher in A.

The top water in A would be 80 ft. above Ordnance datum?—Yes.

Mr. Hill: And about 34 ft. above the land?—About 30 ft. above the land.

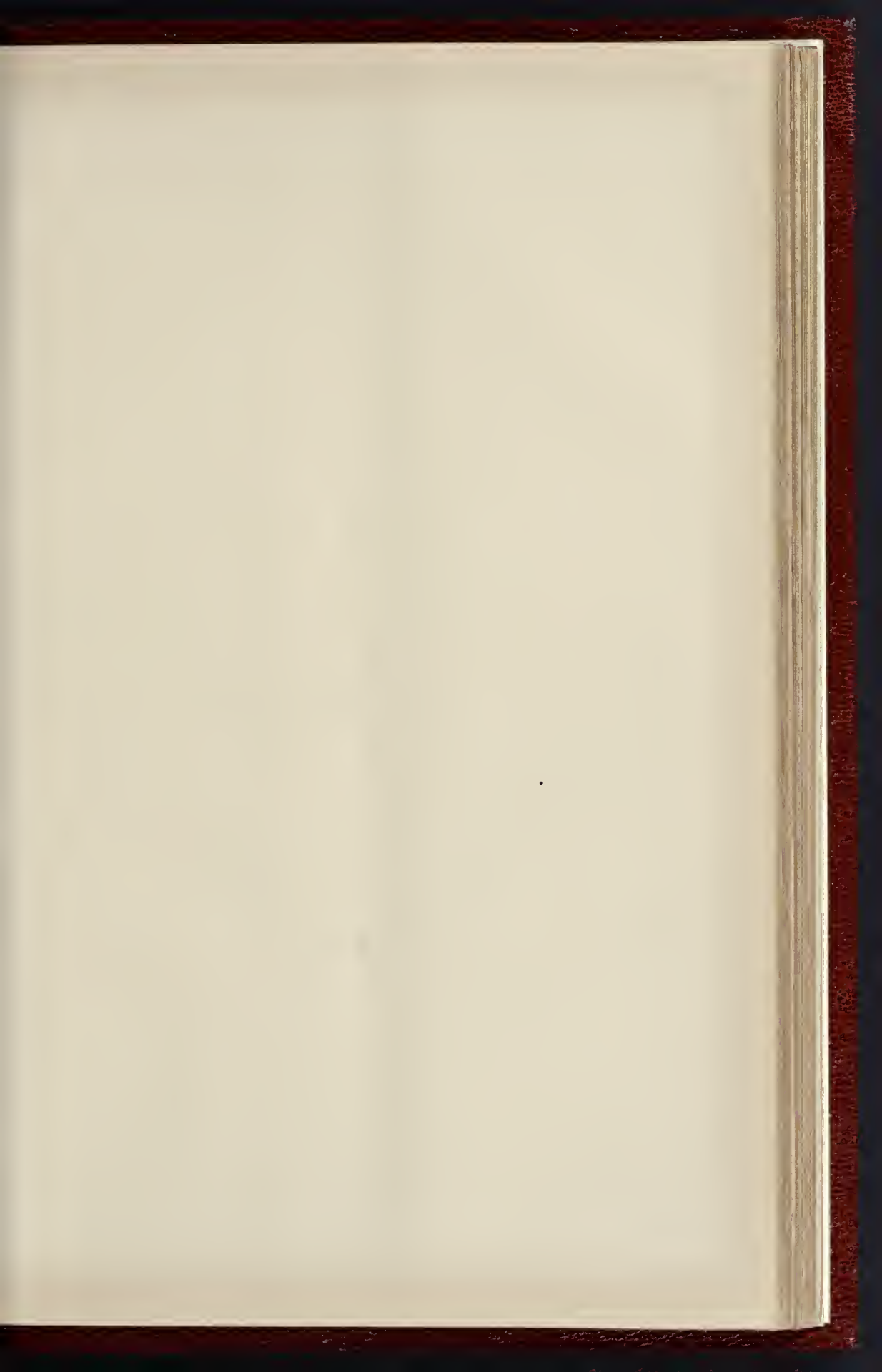
Thirty feet above the land?—Yes; like a railway bank it would look. That region is particularly well adapted for waterworks. There is an immense area, all the way up there for miles, of gravel beds full of water, and there is a beautiful sand for filtering. In the future,—I am talking of the remote future,—that would be a very good place for an extension because at Hampton we are very much crowded up. We cannot extend at Hampton; but out there you can extend in any direction.

You do not propose to deal with the river in any way in consequence of the abstraction of the water?—Not at all; we should leave that.

With reference to those parties who are on the banks of the river, what would they say to this abstraction? Would there be any objection raised by them?—They would never have any greater abstraction than they now have, nor yet so much, because we have provided for the minimum flow of 200,000,000 gallons a day over Teddington Weir.

Mr. Mansergh: Where did you put the 200,000,000 gallons into the river?—We do not take them out; we let them alone; we take the surplus and put it into the reservoirs.

Leaving always the 200,000,000 gallons?—





H. G. Paul
1892

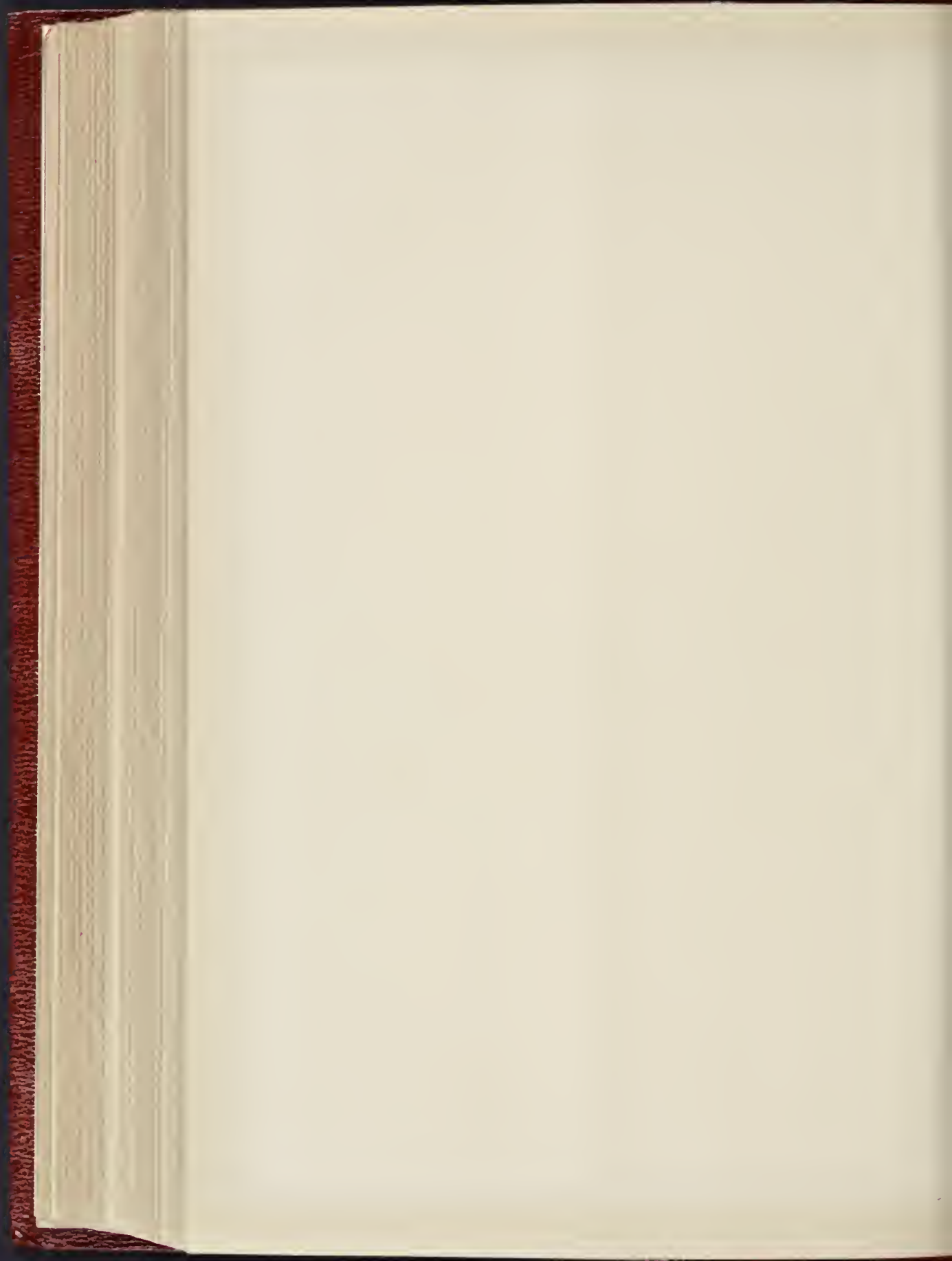
Cathedrals of C
No 25 ST DAVID'S FROM THE NO



and Wales.

—DRAWN BY MR ROLAND W PAUL

INA PHOTO SPRAGUE & CO 4 & 6 EAST HARDING STREET FETTER LANE E.C.



Yes, I imagine that if it were carried out there would be a weir at that point, and if the water was below that it would not flow over. It would be automatic.

You do not show any filters in connexion with these reservoirs?—None at all.

You propose at present to filter that quantity down at your works?—Down at the present filters.

But if filters were necessary as the demand increases you say this is a favourable place?—A very favourable place.

Where the reservoirs are constructed would be a favourable place for the construction of filter beds?—Yes, because there is land and material.

Then you would get about 8 ft. to 10 ft. of water running into the reservoirs by gravitation?—Thereabouts.

And pump the 30 ft.?—Yes.

Now, you have got down as the estimate for reservoir A, 899,000l.?—That includes a conduit,—one line of conduit right down to Hampton.

What size would you make that conduit?—10 ft.

Sufficient to take how much water?—Two of them will take the whole 300,000,000 gallons a day.

You make that at first?—Make one first and the second after. It would be convenient to make it in the clay and line it with iron as they make those electric railways.

I understand now what seemed an anomaly in these estimates, where you have got the 899,000l.; that includes the cost of the reservoir and one conduit?—Yes.

Then your second 2,000,000,000 gallons, reservoir B, you estimate at 368,000l., which comes to 189l. per million?—Yes.

Then the next 2,000,000,000 gallons comes to 368l. a million; but that includes another conduit, I take it?—Another line of conduit.

Then you really estimate that those reservoirs can be constructed for about 180l. per million gallons?—It is thereabouts.

There is one thing I cannot understand in the next item, "annual pumping charges on 256,000,000 gallons per day based upon present cost to waterworks companies of 2.50l. per million gallons?"—I think that is Mr. Hunter's estimate, capitalising the pumping into the reservoirs.

But it is an annual pumping charge of 2.50l. per million gallons; there must be something wrong about that?—That is taken from Lass's "Tables."

The lift will not be more than 35?—Not more than 30.

Later on, when you go into further details, somewhere towards the end, the cost of pumping is put down at 5s. per million gallons?—That, I think, is the future pumping into the district.

Mr. Hunter: That is the pumping in the future. The 2.50l. is the cost from Lass's Tables of the whole pumping into the whole of the districts of the companies, at a height, perhaps, of 300 ft. on an average, or it may be as much as that altogether. You see this is only 15 head of water, and I take it at 5s. as being a fair comparative cost.

Mr. Mansergh: The 2.50l., of course, is the cost of pumping up to your high lifts in London.

Mr. Hunter: Yes, this is taken at 5s., which is a great deal more in proportion, but that sum is put down as something which would be fair and reasonable.

Sir A. Geikie: May I ask if this is a scheme which would not be undertaken by your company alone, or a general scheme by all the companies?—It would be a general scheme if ever carried out, certainly.

Do you appear here having had a consultation with the other companies? Yes, I do. It was prepared by us, and the Chairmen of all the companies authorised its being laid before the Commission.

Mr. Mansergh: The water in these reservoirs would be taken in an intermediate stage?—Yes, after the first flood is by, we should take the rest, which is very good.

So that what you pump into the reservoirs could not interfere prejudicially with the interests of the riparian owners between Staines and Hampton?—Not at all.

Mr. Hunter: Will you allow me just to add one thing? It is my strong opinion that, in the interests of the consumer, it is desirable and necessary that the Thames and Lea should be

utilised to the utmost extent before recourse is had to any other watershed. I want to emphasise that.

Sir A. Geikie: I understand from your evidence that you think the Lea watershed much more need than the Thames is?

Mr. Hunter: Exactly.

Mr. G. F. Deacon, C.E., gave detailed evidence against the nine reservoirs that had been proposed by Messrs. Marten and Rofe, and also on rainfalls and discharges; Mr. A. R. Binnie on the flow of the Thames; Dr. T. O. Dadfield (Medical Officer of Health for Kensington) on the water supplied to his district; and Dr. Percy Frankland put in additional statements relating to bacteriological researches, on which subject Dr. Klein and Professor Ray Lankester also gave evidence.

The Commission stands adjourned to the middle of December.

THE LONDON COUNTY COUNCIL.

A SPECIAL meeting of this Council was held on Friday, the 25th ult.

The Woolwich Ferry.—The Bridges Committee brought up a report recommending the acceptance of the tender of Messrs. R. & H. Green for a ferry-boat for 17,325l. Messrs. Green's tender was not the lowest, the following being lower than that proposed for acceptance: Messrs. W. Simons & Co., 15,800l., and Messrs. W. Allsop & Son, 15,900l.

The Hon. R. Grosvenor, the Chairman of the Committee, in introducing the report, said that the difference in the price showed the difference in the trade union rate of wages in Glasgow and London.

Mr. Torrance moved, as an amendment, that the recommendation be referred back to the Committee, with an instruction that the tender of Messrs. Simons & Co. be accepted, provided that the usual inquiries result in showing that their position and standing are satisfactory. He said that the proposition of the Committee was the most audacious ever submitted to the Council. There was a great principle at issue. How could they expect county contractors to come forward if this was the system to be adopted? It was a most unfair and ungenerous proposal. They talked about Free Trade, but this was a plain proof that the spirit of Protection was rampant in the Council.

Mr. J. G. Weir, M.P., seconded the amendment, and said it was a gross injustice to the ratepayers to be asked to pay 1,500l. more than they needed to do. It was only within the last few days,—since a deputation of the unemployed had waited upon the Council,—that the proposition was brought forward. If the Council intended all its work to be done in London, they had better tell country contractors so.

Mr. Alderman Arnold said the interests of the Council and its duties were wider than London. They had invited tenders from every part of the kingdom, and he hoped they would never regard London as an isolated town, but as the centre of the empire.

On a division, 64 voted for the amendment and 23 against. The tender of Messrs. Simons, of Glasgow, was, therefore, accepted.

The usual weekly meeting of this Council was held on Tuesday afternoon last, the Chairman, Mr. John Hutton, presiding.

Tenders.—Tenders were received for the formation of new roads, airing courts, &c., at the Claybury Asylum (The list appears in another column of this issue of the *Builder*).

The Albert Palace, Battersea.—The General Purposes Committee recommended that, subject to the Albert Palace, together with the grounds attached thereto, being handed over to the Council free of expense and in good repair, the Council should apply to Parliament in the next Session for power to accept the gift, and to manage and maintain the palace and grounds as a place of recreation for the public. The Architect reported that the cost of maintenance, as part of Battersea Park, would be 4,700l.

Mr. Fardell urged that the Council should have more information as to the responsibility entailed, and as to the uses to which the building was to be put.

Mr. Benn, M.P., said the maintenance of the structure, both internally and externally, represented 1,200l.; attendants, watchmen, and firemen represented about 2,500l.; gas, insurance, &c., 1,000l.—making 4,700l. a year. The understanding was that the building should be handed

over to the Council as a freehold, with the structure and the organ in good order.

The recommendation of the Committee was verbally amended so as to make clear that the Palace and grounds were freehold, and acquired by the Council free of expense and in good repair.

Mr. Beachcroft moved to add that power be given to the Council to make, from time to time, such reasonable charges for admission as they thought fit.

Mr. Robinson seconded the amendment, which was carried by a large majority.

After further discussion and verbal amendment, the Committee's recommendation was carried, not without protest by some members that the proposed gift would prove to be "a white elephant."

Proposed Taxation of Ground Values.—The Local Government and Taxation Committee presented a report on this subject. The first resolution they proposed was

"That it is imperative that the relief of the occupying ratepayers of London from the increase of charge should be secured in the next Session by the provision of some new source of revenue, such as, by way of illustration, a municipal death duty, rent duty, or special rate on ground values."

Mr. Costelloe, the Chairman of the Committee, in moving the adoption of the resolution, said he thought they would be all agreed that some new source of revenue was necessary, and they desired to put the taxation where it would lie and where it would remain. The unearned increment of rent in London year by year represented a capital value of 4,000,000l. to 5,000,000l., and possibly more. That, of course, was not the annual income, but the capital value. Ground values might be defined as all forms of wealth produced for the owners of land by the constant increase in the value of property, due to the industry of the community, and to the increase of which the owner or leaseholder had himself contributed nothing.

Mr. Stuart, M.P., moved, as an amendment:—

"That it is imperative that the relief of the occupying ratepayers of London from the increase of charge should be secured in the next Session by the provision of some new source of revenue; that in the opinion of the Council the most equitable method of securing this relief is by the taxation of the ground values of London; and that it is urgent and necessary to take immediate action to that end in the next Session of Parliament, and subject to the ultimate settlement of this question, some immediate relief might be obtained by an interim special rate on ground values, rent duty, or municipal death duty."

He said that the time for action had now come, and he pressed his amendment as a practical proposal.

Mr. Charles Harrison, Vice-Chairman of the Council, seconded the amendment. He said that ground values did not at present contribute to taxation, and because that was so ground values were a new source of taxation and a new kind of property to be taxed.

The amendment was, on a division, carried by 66 votes to 21, and it being then 7 o'clock, the debate was adjourned to a special meeting to be summoned for Thursday, December 1, at the moment when we go to press with this number.

BUILDERS' BENEVOLENT INSTITUTION:

ELECTION OF A PENSIONER.

An election of one male pensioner on the funds of this Institution was held at the offices, 35, Southampton-row, Bloomsbury-square, on Thursday, the 24th ult., Mr. George Plucknett, J.P. (Treasurer), in the chair. There were two male candidates for the vacancy, besides three female applicants who received votes.

Shortly after the close of the poll, the scrutineers (Messrs. Thomas Stirling and T. F. Hider) announced the result of the polling to be as follows:—Joseph Lestock Mould, aged seventy, of 60, Muriel street, Islington, builder (second application), 637 votes; John George Bishop, aged sixty-five, of 21, Spencer square, E. Walk, Ball's Pond, widow of Francis Drake, late of Acton, builder (fourth application), 2,272 votes, including 250 votes in respect of his subscriptions to the Institution. The successful candidate was, therefore, declared to be John George Bishop. The votes given to the female applicants were as follow:—Sarah Elizabeth Drake, aged sixty, Tylers and Bricklayers' Almshouses, King Henry's, Ransgate, Ball's Pond, widow of Francis Drake, late of Acton, builder (fourth application), 2,283 votes; Susanna Mansell, aged sixty-eight, of 20, Bridge-road, Hammersmith, widow of William Mansell, late of Hammersmith, builder (third application), 2,484 votes; and Mary Ann Healding, aged sixty-two, of Curtain-road, Spitalfields, widow of Samuel Thomas Healding, late of Spitalfields, builder (second application), 139 votes.

' Among the friends of the Institution (other than those already named) who took part in the proceedings were Messrs. G. J. Lough, W. J. Mitchell, G. N. Watts, J. W. Scrivener, G. B. New, R. Richardson, G. Bussell, and J. T. Bolding. Votes of thanks to the Chairman and scrutineers closed the proceedings.

Correspondence.

To the Editor of THE BUILDER.

"ARCHITECTURE A PROFESSION OR AN ART."

SIR,—Although I ought to have written "from time beyond living memory," instead of "from time immemorial" [p. 400, ante], surely Mr. Jackson is a little hypercritical in speaking of his examination being in literature and not for literature. The Institute examination is one in (the art of) architecture for a specific purpose. So also is that in the dead languages an examination in literature for another specific purpose. It may not have to do with Mr. Jackson's argument, but it has with mine. For, as a man may be taught and trained and examined in literature, so he may be taught and trained and examined, as I pointed out, in architecture; and this is the preliminary fact which is denied altogether by Mr. Jackson and his allies.

What use may be made eventually of the examination is quite another matter. But the passing of the examination is the first step towards fitting a man for his subsequent work in life. He may not become more than in name, an architect, a poet, or an author. This must depend upon his own personal capabilities. Again, the incidental fact of the exercise of (the art of) architecture being strictly limited by certain legal restrictions of structural and sanitary security, is no more than the incidental fact of the exercise of literature being equally circumscribed by the legal bounds of morality and decency. And the question whether architecture shall be or shall not be made a close profession does not affect in the least degree the exercise of the "Art," or the main issue of the possibilities of such an examination on the one hand, or of the futility of it on the other.

WILLIAM WHITE, F.S.A.

THE INSTITUTE AND ARCHITECTURE.

SIR,—In a work recently published, "Architecture a Profession or an Art," I find that an address to the Royal Institute of British Architects which I signed is placed at the head as a sort of text for an attack on the Institute.

When I signed this document a serious attempt was being made to obtain legislation for what is termed "closing the profession." The Institute was petitioning the House of Commons against it, and it is a step to which I see very great objection. I signed in all good faith with the Institute, and I think that I might have been consulted before my name was used so as to appear hostile to it.

With regard to the Institute Examinations, I feel sure that the healthy stimulus they give to exertion and study is very decidedly advantageous. Before they existed, no means were available by which to ascertain whether an applicant for admission had any real qualification for his work. Surely it is a step in the right direction to encourage men to study and show that they have done so to some effect?

I should be glad to see another step taken by which the Institute would become a teaching body. For the present it has taken the line of assisting the ever-vigorous Association in the work of education, and perhaps they will work together on broader lines than if they work singly.

There seems to be no reason why the Institute should not assist in the education of designers and artificers of all classes connected with architecture, and become (as advocated in the book alluded to) an Institute of Architecture; but that happy time will be more speedily brought about if those who desire it use their influence to promote it, instead of holding aloof with the apparent object of driving the Institute into narrow ways.

W. M. FAWCETT.

THE TREATMENT OF ANCIENT WALL-PAINTINGS.

SIR,—I am often asked what is the best way of treating the remains of ancient wall-

paintings, and should therefore like to inquire of Mr. Newman* the nature and properties of the preservative solution which has been applied to the Harbledown and other paintings.

After the sad fate of much delicate work at Westminster and elsewhere from the use of "preservative solutions," it would be reassuring to those of us who value old work to know that wall-paintings can be really preserved by such means.

W. H. ST. JOHN HOPE.

THE OLD TEMPLE.

SIR,—In the historical note on "Stone Buildings, Lincoln's Inn" (p. 392, ante), it is stated that "next east" of the site of the Black Friars' first London settlement was "the inn of the Bishops of Lincoln near the Old Temple." This needs a little explanation. The residence of the Bishops of Lincoln and the Old Temple were really identical. The first dwelling-place of the Knights Templars in London, where they established themselves in 1118 A.D., was on the south side of Holborn, beyond the bars. On their removal to the site long inseparably associated with their name between Fleet-street and the Thames, this "Old Temple" was purchased by Robert de Chesney (de Querecto) Bishop of Lincoln, singularly called by Stow, "Robert de Carars," about four years before his death (which occurred in 1166) as a London residence for himself and his successors in the See. This it continued to be till the spoliation of Edward VI.'s reign, when it was granted to Wriothesley, Earl of Southampton, whose name still survives in Southampton-buildings. The sum Bishop Robert gave the Templars for the property was 100 marks, and he had to pay three gold pieces annually to them "pro annuo servicio." The charter of Henry II., confirming the sale, is given in Dugdale (vol. vi., p. 1295, No. liv.); it runs "Sciatis me concessisse, &c., &c., Ecclesie Beate Marie Linc. ad Roberto episcopo ejusdem ecclesie domos quae fuerunt fratrum Templi Londoniis in parochia S. Andree de Holborn cum capella et curia, atque, &c., quas idem Robertus emit C. marcus de fratribus Templi." In the "Magna Vita" of Hugh of Avalon, Bishop Robert's sainted successor in the See, we find the "Old Temple" as the "inn" of the Bishops of Lincoln: "proprium diversorium quod secus Londonias apud vetus Templum possidebat." (p. 331.) This was the scene of Hugh's last illness and death, November 17, 1200; and in the Templars' former church, "ecclesia beate Marie apud Vetus Templum," his "viscera" were hurried prior to the transportation of his body to Lincoln. His biographer, in his report of a miraculous vision seen by him the night before Hugh's death, gives some curious particulars of the dwelling, such as only one familiar with the place could supply. He tells us of a "piscarium,"—"viridarium,"—shut in by the buildings of the "hospitium" on the north and west, &c., towards Holborn and the present Chancery-lane,—a thoroughfare not then in being, even under its older name of New-street. On the east and south there was a ditch overgrown with hushwood and briars. A tall pear-tree stood against the wall of the house just against the spot where the head of the bishop's bed stood; altogether a very different picture than that which Holborn and Chancery-lane now present.

From the passages quoted it is abundantly evident that the old Temple and the Bishop of Lincoln's Inn,—quite a distinct place from what we know as Lincoln's Inn, which took its name from Henry Stacy, Earl of Lincoln,—was one and the same. Stow distinguished them in the later edition of his "Survey"—"adding to this Old Temple was sometime the Bishop of Lincoln's Inn," but in the first edition he stated the fact correctly: "The Old Temple, the same was after the Bishop of Lincoln's Inn." The mistake of the old topographer has naturally been perpetuated and accepted. We are to look for the site of this "historic mansion, according to Mr. Wheatley ('London Past and Present,' pp. 231-2), at No. 822, Holborn, and the former "Blue Posts" tavern, No. 47, Southampton Buildings. In 1847 what was still called "the chapel" was standing on the Holborn site with rubble walls and a flat-timbered ceiling, and Mr. Peter Cunningham was told by the then occupier, Mr. Griffiths, that when making some alterations on the premises he had come upon portions of a circular building, evidently a fragment of the Templars' first church. This church, the "capella" granted by Henry II., to Bishop Chesney, is described by Stow, who appears to have seen what remained of it nearly three centuries ago, as "round in form, as the new Temple by Temple Bar and other Temples in England." It would be interesting to know whether any traces of the Old Temple still exist on the above-named sites.

EDMUND VENABLES.

THE LAW OF LIGHT.

SIR,—In last week's number you refer to a recent decision on the law of light, and suggest the action of the Institute with reference to the amendment of the existing laws on the subject. Allow me to draw

* See letter, page 401 ante.

your attention to the enclosed extract from the "Proceedings," issued January 7 last, containing a report to the Council from the Science Committee recommending that an Act of Parliament should be promoted for the purpose, and the text thereof. We have as yet been unable to get the Council to take any definite action in the matter, but hope your remarks may exercise some influence.

WILLIAM C. STREET.

A COAL FIRE—WHAT COAL?

SIR,—Your correspondent, in last week's issue pleads for the cheerfulness of the coal fire. Allow me to tell him that he can obtain all the warmth and glow that he requires from an anthracite fire, without smoke, smell, or dirt. The Smoke Abatement Exhibition of 1882 proved a failure, chiefly because its outcome consisted of certain compulsory grates and other structural provisions. Considering that anthracite is burnt so largely in America, it is a source of wonder to me that this unique coal, which is found in our own country, should have been so long neglected.

R. S. R.
* * * But what is the extent of the supply of anthracite in comparison with bituminous coal, and how will its cost be affected if every one wants it?—Ed.

The Student's Column.

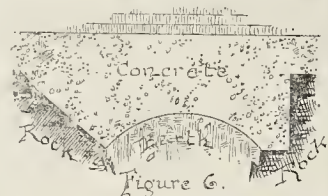
CONCRETE.—XXIII.

FOUNDATIONS (Continued).

SOMETIMES the whole site of a building is covered with concrete. The least allowable thickness is 9 in., if the brick footings of the walls are to be built directly upon the concrete; but a thickness of 12 in. is more usual, even for the smallest buildings, and a thickness of 18 in. and upwards is adopted for larger structures, according to the weight of the building and the nature of the ground.

Frequently, however, an additional thickness of concrete is put under the walls. Sometimes the concrete under the walls is kept quite independent of the concrete layer which is spread over the site, the layer in this case being usually only 6 in. thick, and the top of its finishing level with the top of the concrete foundation or with the top of the brick footings, if the appearance of these in the basement would be objectionable; such a layer is really not part of the foundation.

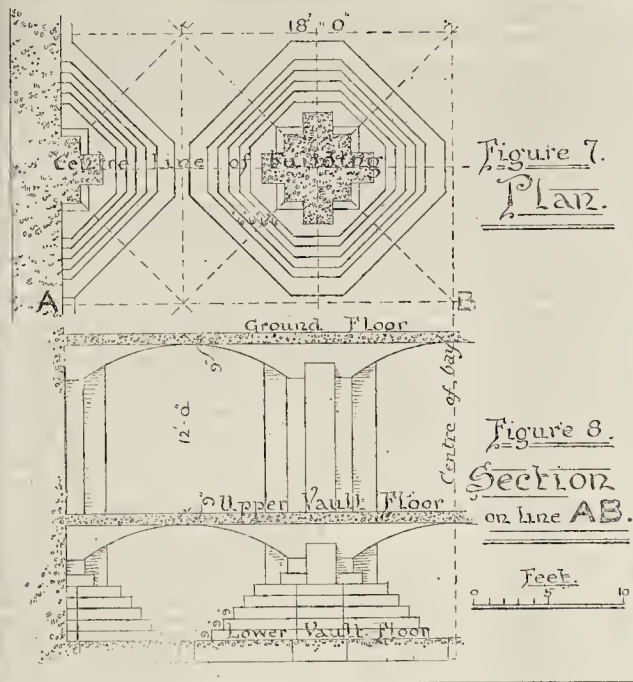
The application of concrete to foundations is not, however, confined to simple slabs. In rocky ground, concrete may be used in the form of an arch or lintel to span a soft dyke, abutting at each end on the solid rock, which may be played or henced to receive it, as in figure 6. The thickness of the concrete must



be regulated by the weight the arch has to carry; the strength of concrete arches will be considered hereafter. The earth under the concrete can be brought to an arched form and rammed, so that no boards or centres will be required.

Sometimes it will prove economical to erect concrete piers, and to form concrete arches or arched lintels over them, instead of forming a continuous concrete foundation. The ground under the piers should be very firm, or disaster may follow. On steep ground the system of piers and arches is often advantageous. Figures 7 and 8 show the method adopted (1882-4) in the foundations of the east wing of the Army Headquarters at Simla, India.* The ordinary foundations in these buildings consisted of a series of concrete piers to carry iron columns, and with cross-footings between to carry the cross walls, but where the excavation, in order to get a good bottom, was carried more than 10 ft. deep, "groined arches" were thrown from pier to pier to carry the cross walls. The concrete for the whole of the buildings consisted of hydraulic lime, ground on the building-site and used quite fresh and

* See paper by Mr. Walter Smith, A.M. Inst. C.E., in the "Proc. Inst. C.E.," vol. lxxiii. (1885-6), part 1.



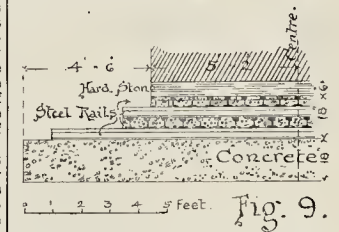
this the pier is built of brick. The total thickness of the foundations is only 3 ft. 6 in., while the thickness up to the top of the uppermost set-off is only 2 ft. 7½ in.

GROUTING.—Where a building has to be erected on a bed of good, clean gravel, concrete may be unnecessary, as the gravel can be consolidated where required by grouting with thick, neat cement grout. Thin grout does not set well, and grout containing sand is liable to give great inequality of strength, as the sand and cement easily separate, and one part of the grout may be nearly all sand, while another is nearly all cement.

Concrete in Water.—We do not propose to describe the various kinds of concrete foundations used in works in the sea, such as the large-block system or the bag system; but a word or two about concrete caissons or wells may prove useful. These have been used on many occasions, both for works in the sea and for works on marshy ground. They consist of a rim or cutting edge, frequently of wood and iron, on which is raised a concrete wall either in the form of a circle or a rectangle; the rectangular form is more easily built, but the circular form, although more difficult to construct on account of the shaped frames which are required, ought to be adopted, as such caissons can be sunk more regularly and are less liable to crack in sinking. In large caissons of rectangular shape, iron tie-bars are sometimes imbedded in the sides to prevent cracks. The height of the first portion of the caisson may be about 5 ft. This is placed in position, and is sunk by men digging inside, or, when the water becomes too strong, by excavating with chain-grabs or other contrivance. When the sinking has been continued far enough, another height of concrete is added to the caisson, and so on until a proper foundation has been reached. At Colombo Harbour, Ceylon,* the depot-wharf wall is founded on a double row of concrete cylinders, each section being 5 ft. in external diameter and 3 ft. 6 in. deep, the concrete being 12 in. thick. Another part of the wall is founded on cylinders 7 ft. in external diameter, the concrete being 15 in. thick; these cylinders were formed in sections 4 ft. 10 in. deep. The concrete in the lowest or cutting ring of each caisson was composed of 1 part Portland cement to 3 parts stone and sand; the concrete in the remaining sections was of 1 part cement, 2 parts sand, and 3 parts stone.

At Felixstowe tidal basin rectangular concrete caissons, 30 ft. by 20 ft., were used with walls 5 ft. thick, built on a curb of wood and iron sloped down from the inside at the angle of 45 deg. to an outer cutting-edge of cast-iron. As the sinking proceeded, concrete was added in layers 3 ft. 3 in. high, until the caissons had reached a proper depth; 6 to 1 concrete was then filled into the caissons to a height of 7 ft., and 10 to 1 concrete for the remaining height.

The proportions of the ingredients in concrete used for works in the sea vary according to



the purpose for which it is required. In sheltered places and in the hearing of walls 12 to 1 concrete is often used, while in exposed places and for face-work 4 to 1 or 6 to 1 must be used.

THE ENGLISH IRON TRADE.—Quietness continues to prevail in the crude-iron branch, and prices, although exhibiting little change, have a downward tendency. The inquiry for tin-plates has somewhat lulled. In manufactured iron little is doing, and quotations are depressed. In the steel department few signs of activity are observable. Shipbuilding orders are more plentiful; but the price at which they have been secured leaves little margin for profit. Engineers are quiet. The coal trade is also slackener.—Iron.

without slaking or wet-grinding; *sarkhi* (pounded bricks), ground on the site and screened through a sieve of 132 meshes to the inch (superficial) for fine work, and through ½-in. and ¾-in. bar screens for ordinary work; and *limestone*, broken by hand to pass a 1-in. ring. The lime and *sarkhi* were mixed dry in the proportion of 1 to 2; 5 cubic feet of ground lime + 10 cubic feet of *sarkhi*, mixed dry, made 14 cubic feet of "dry mortar." This was mixed with the aggregate in the proportion of 42 to 100 for ordinary foundations, and 45 to 100 for walls and arched vaulting. For ordinary foundations, therefore, the concrete consisted of 1 part lime, 2 parts *sarkhi*, and 6-6 parts broken stone, a rather poorer concrete than would be allowed by the London County Council. The following table shows the material used to make 100 cubic feet of rammed concrete of each kind:—

TABLE XXV.

Bulk of Ingredients in Lime Concrete.		Walls and Arched Vaulting.
	Ordinary Foundations.	Arched Vaulting.
	cu. ft.	cu. ft.
Lime	17.5	19
<i>Sarkhi</i>	35	38
Dry Mortar	49	53
Stone Ballast	117	117
Rammed Concrete. 100	100	100

The concrete in the foundations was deposited in 3-in. layers, and "rammed until the moisture exuded at the top, and the blows of the rammer caused no further yielding in the mass." Stones and boulders were imbedded in the concrete, and in this way a saving of about 6 per cent. was effected. The outline of each foundation was marked by rough stone walling lined with planks, and as each course was completed and sufficiently set (usually in three days), the planks were removed and the space between the piers was filled with earth well rammed. Successive courses were laid in this manner until the springing of the arches was reached. Then earth was heaped up, well rammed, moulded by templates to the shape required for the grouting, and plastered first with cow-dung and afterwards with lime-plaster. Concrete was then deposited and rammed up to the floor-level, each vaulted arch being completed to its full thickness before the next was commenced. At a later period the earth-centres

were removed, when the groins were found to be clearly defined."

When concrete is laid on piles, it is customary to cut the tops of the piles to one level and to excavate between them to a depth of 1 ft. or more; the concrete is then deposited between the piles and well rammed, successive layers being added above the heads of the piles until the requisite thickness has been attained.

In America, where buildings of extravagant height are often erected, great attention is of necessity bestowed upon the foundations. In the case of the offices of the *New York Tribune*, a building measuring 150 ft. high from the foot-path to the eaves, the substructure consisted of a bed of concrete the top of which was 25 ft. below the footpath. The concrete rested on a good bed of firm red beach sand, and was composed of 1 part Portland cement, 3 parts sand, 4 parts clean white gravel, and 5 parts broken stone, mixed wet and well rammed in 6-in. layers to a total thickness of 18 in. This mixture (1 to 12) was found strong enough, but it must be confessed that little or no transverse stress was applied to it, for immediately over it was laid a course of immense granite slabs 9 ft. wide and 16 in. thick, and on this the foundation-walls, 6 ft. 8 in. thick, were built of fire-brick laid in Portland cement, with granite bond-stones 10 in. in thickness at intervals of 3 ft. up to the level of the basement floor.

In Chicago the practice of bedding steel rails in concrete for foundations has been recently adopted. It appears from Mr. A. Arthur Cox's report* that in that city "the subsoil is composed of a black loamy clay, which, on the surface, is tolerably firm, but a few feet below, and in some parts to a depth of 12 ft. to 15 ft., is quite unfavourable to building operations." Where cellars are required the footings must be as shallow as possible, so as not to get into or near the soft substratum. Fig. 9 shows the foundation of one-half of a pier in the "Rookery" Office Building, Chicago. This building is eleven stories high, each story measuring about 12 ft. A layer of concrete 18 in. thick is first deposited, and on it are laid four courses of steel rails 4½ in. deep, the first transversely and the next longitudinally, and so on; these are "spaced evenly at small intervals," the spaces being thoroughly filled with cement concrete. On the top of the rails is laid a course of hard stone 6 in. thick; above

* See "A Tour in the United States," by A. Arthur Cox, holder of the Godwin Bursary. "Transactions of the R.I.B.A." 1891.

* "Proc. Inst. C.E.," Paper by Mr. John Kyle, vol. Lxxvii. (1886-7), Part I.
† Mr. John Russell, in discussion on Mr. Kyle's Paper.

OBITUARY.

MR. HUGH BARCLAY.—The death of Mr. Hugh Barclay, senior member of the firm of Messrs. H. & D. Barclay, architects, Glasgow, took place on the 25th ult. According to the *Glasgow Herald* he was sixty-four years of age. Mr. Barclay was a member of the Glasgow Institute of Architects, and acted on the Council of that body for a number of years. He was the architect of the Greenock Municipal Buildings, the Glasgow Academy, and several schools in Glasgow and Govan.

GENERAL BUILDING NEWS.

WARD'S CITY OF LONDON SCHOOL FOR GIRLS.—The foundation stone of Ward's City of London School for Girls, to be erected on the Victoria Embankment, on land at the rear of the Guildhall School of Music, was laid on Wednesday last by Mr. J. Barrett, the chairman of the Law and City Courts Committee, which has charge of the construction. The architect is Mr. Andrew Murray, the City Surveyor, and the design is in the Italian style. The building will be faced with Portland stone, and will accommodate about 400 scholars. On the ground-floor will be the Lady Principal's room, and an office for the Secretary, the former of which will be so arranged as to serve for a library and a committee-room. In all there will be sixteen class-rooms, a luncheon-room on the top floor, 53 ft. by 27 ft., for 240 pupils; the housekeeper's apartments will be in the attic. In the basement will be the cloak-rooms and lavatories, and also a recreation-room of 951 ft. super.; this will be lighted by a skylight. Boyd's ventilating stoves will be used for warming the class-rooms; the basement will be floored with asphalt, the class-rooms with solid wood blocks upon concrete, and the treads of the stairs will be of teak. The contractors are Messrs. Albertson & Latta.

RESTORATION OF MADRESLEY CHURCH, NEAR ORMSKIRK.—This church, which has just been restored, was opened recently by Bishop Cramer-Roberts. The accommodation provided having for some time been found to be very inconvenient in its arrangement, it was decided to rearrange the interior throughout, and to effect other improvements. New benches were provided throughout of pitch-pine, and arranged with central and side aisles. A gallery has been provided at the west end, with convenient staircase, while new screens have also been erected. The entrance has been entirely rearranged. The old flat ceiling has been removed, and the roof left open, being finished in plaster of cream colour, and baring the timbers visible. The whole of the work has been carried out by Messrs. Moore Bros., of Rawtenstall, from the designs and under the superintendence of Mr. R. Knill Freeman, of Bolton.

BAPTIST CHAPEL, RAWDON, YORKSHIRE.—On the 16th ult. a new Baptist Chapel was opened at Rawdon, Yorkshire. The plan of the new building consists of a room measuring 75 ft. by 37 ft., and 27 ft. in height. There are two shallow transepts, which can be extended when further accommodation is required. At the north end are the vestibules, and over them the gallery, three seats deep. At the opposite end of the chapel is a recess containing the organ, and seats for the choir. In front of the latter is the pulpit, whilst immediately under this is the raised dais and the large baptistery. At the south end are the vestries, and over them a class-room. Accommodation is provided for 430 worshippers. The woodwork generally is of polished pitch-pine. The building is of stone. The architects are Messrs. T. H. & F. Healey, of Bradford.

WESLEYAN CHAPEL, CHELSTON, TORQUAY.—On the 16th ult. Mr. E. Mallock, M.P., laid the central foundation-stone of the first section of a Wesleyan chapel to be erected at Chelston. The site is situated at the junction of Hixtable's-hill and Old Mill-road. The plans, which have been prepared by Messrs. Rowell & Son, architects, of Newton Abbot, provide for a chapel, vestries, and school, but the present contract is only for the school. The building will be of local red rock, taken from the site, faced with white brick, and affording, when completed, accommodation for about 400 persons. The school will accommodate 150 persons. The first section, for which Mr. S. Blackford, of Upton, is the contractor, will be about 550.

PRESBYTERIAN CHURCH AND SCHOOLS, MOLD.—The Presbyterian Church and Schools just completed here are erected on a site near the Railway-station, and are approached by a flight of steps leading to tiled vestibules and porches. The style is Gothic, and the building will seat over 450 persons. The front portion is semi-circular on plan, and the sittings are arranged in a gallery form, with stepped aisles leading to the body sittings. The school buildings are at the rear, and contain on the ground a school-room to accommodate 200 persons, three class-rooms, minister's vestry, and conveniences, with a larger school-room. The contractor is Mr. Thomas Roberts, of Mold; the clerk of works, Mr. John Roberts, of Ruthin. The heating arrangements were carried out by Messrs. Saunders, of Manchester; and Lackland & Co., of Birkenhead, supplied the glass. Messrs. Pearson & Brown, of

Manchester, executed and supplied the forms and sittings. The architect is Mr. T. G. Williams, Liverpool. The cost, exclusive of land, will be about 2,200.

A NEW HOTEL AT NEWCASTLE.—A new hotel has just been opened at Newcastle; it will be known as the Hotel Métropole. It consists of the Old Alexandra Hotel and the Excelsior Temperance Hotel in Clayton-street, converted into one, and much altered and renovated internally. There are two entrances to the building from Clayton-street, and these entrances are connected by a corridor passing in front of the offices and business department of the hotel. The main staircase is opposite the south door. On the right on entering is a private dining-room, and on the left a dining-room, 40 ft. long by 24 ft. wide. A staircase at the west end leads into a small private dining-room; and under this is the serving-room. The smoking-room is on the left upon entering by the north door, and the billiard-room on the right. The latter is 40 ft. long by 22 ft. wide. Opening from the west end of the billiard-room are a small buffet, a smoking-room, and ample lavatory accommodation. Facing the entrance is the buffet, with walnut fittings, executed according to the architect's designs. Tins work, together with the oak work at the entrances, has been carried out by Messrs. Robson & Sons. The remaining public rooms are on the first floor. They consist of a commercial-room, 40 ft. by 24 ft., a private dining-room for ladies, a large private dining-room and suites of apartments, comprising bedrooms, sitting-rooms, &c. On the upper floors there are sixty bedrooms. In addition, there are stock-rooms. The principal rooms are lighted by electricity. Messrs. Lamb, Armstrong, & Knowles were the architects. Mr. Tyrrie, of Gateshead, had the contract, and Messrs. Green & Son have done the decorative work.

SCHOOL BUILDINGS, GATSFHEAD.—The foundation-stone of the new Ellison School, Hopper-street, Gatshead, was laid on the 7th ult. by the Mayoress (Mrs. Walker Wilson). The new Ellison School is to take the place of the old building in Holy Trinity Church. The contract for the school has been let for 1,500, and the estimated cost of the enlargement of the church is 3,000. The school will be built of brick with stone dressings. It will be on the site at the east end of the church, and will be a one-story building. The architect is Mr. Stephen Piper, Newcastle, and the contractors are Messrs. Anderson & Slater, Newcastle.

LUNATIC ASYLUM, GLASGOW.—On the 8th ult. the memorial-stone was laid of the new asylum which is at present being erected at Gartloch, about six miles north-east of Glasgow, by the City of Glasgow District Lunacy Board. The asylum is being erected for the accommodation of the city lunatic poor in connexion with the Glasgow District Lunacy Board and the City Parochial Board. The buildings are arranged on the pavilion system, and are divided into two distinct parts,—asylum and hospital. The asylum comprises four blocks, the male and female patient accommodation being separate, and each block is connected with the central or administrative department by covered ways. The administrative department consists of a large dining-hall, kitchen, sculleries, general stores; and over the dining-hall is placed a recreation-hall. The official block is situated to the north, and is flanked by two towers rising to the height of about 130 ft. In this is the board-room, doctor's room, waiting-rooms, &c., on the ground floor, and on the upper floors sleeping accommodation for attendants. Each block is divided into two wards, with dormitories above, and is equipped with boot-rooms and lavatory accommodation, and large bath-rooms entering from the corridors. Workshops are situated on the male side, and on the female side a laundry is placed. The hospital block has accommodation for five classes of patients,—wards for observation, for the old and infirm, for acute and noisy, for sick and invalid, and for infectious cases. This block has also a separate dining-hall, kitchen, and stores, &c. Besides the asylum there will be erected a large farm, a chapel, a doctor's house, a gate lodge, and a mortuary. The buildings extend about 700 ft. both ways. The outside of the building is of red stone, and the inside is faced with white stone. Mr. J. Thomson & L. D. Sandilands, of Glasgow, are the architects for the structure, while the contractors are:—For the mason work, Messrs. Crackston & Son; for the joiner work, Messrs. James Herberson & Son; for the plumber work, Mr. James L. Arnot; for the slater work, Messrs. Andrew M. Ross & Sons; for the plaster work, Mr. J. Mackenzie; and for the painter work, Mr. James Moodie.

NEW CHURCH, AVONMOUTH, NEAR BRISTOL.—The foundation-stone of St. Andrew's Church, Avonmouth, was recently laid by Mrs. Miles, of Kingsweston. The site of the church is near the Dock station. Tenders were received for the erection of a church to hold 600 people, and that of Messrs. B. Wilkins & Sons, of Bristol, for 6,500, for the whole church, except the top of the tower, has been accepted; but, as the funds are not all subscribed, it has been decided only to build part of the church. Therefore, only the east end of the church and two-thirds of the nave and aisle can

be built, which will leave unbuilt the two western bays of the nave and aisle, and the whole of the tower and the vestry. The plan of the church have been designed by Mr. W. Wood Bethell, of London, and show a structure which is founded on the Decorated period. When completed the building will consist of a chancel, nave, south aisle, and chancel south aisle. Provision is made for accommodating the school children in the chancel south aisle, where also the organ will be placed. At the chancel end of the nave the tower will be erected. The church will be so constructed that the north wall can be removed and another aisle added. The structure is of red stone, quarried in the parish of Shirehampton, and lined with Bath stone. Provision has been made for the tower on a large bed of concrete. The roofs will be covered with Broseley tiles, and inside they will be of pitch-pine. Ultimately the chancel will be laid with marble mosaic work. Mr. G. Downes is clerk of the works.

GRADUATION HALL AND STUDENTS' UNION FOR ABERDEEN.—According to the *Scotsman*, plans have been prepared, and building operations will commence in the spring, for the construction of a Graduation Hall and Students' Union at Marischal College. This new adjunct to the University is the gift (the structure will cost 15,000) of Mr. Charles Mitchell, of the firm of Lord Armstrong, Mitchell, & Co., Newcastle-on-Tyne. The building is intended to form a portion of the large scheme of extension recently sanctioned by the University Court, and will be erected in the rear, or east side, in connexion with the present halls and museums. The Graduation Hall will measure 100 ft. long by 40 ft. wide, and will have a small gallery projecting from the side walls, and a raised dais at the east end, with stalls round the sides having carved oak canopies. Filling the entire width of the east end of the hall will be a Perpendicular Gothic window of stained glass. The hall will be otherwise lighted by five windows on each side of the apartment, and the roof will be arched in timber, vaulted form, and enriched with moulded ribs and carved bosses at the intersections. The flooring will be of solid oak parquetry bedded on concrete. Externally the walls will be of light grey Kennay granite, the interior being lined with pink granite ashlar, except a high panelled dado of oak, which will surround the lower part of the walls under a small projecting gallery, which will also extend round the sides and west end. There will be four staircases for access to the hall, but the main approach is from the quadrangle by means of the existing staircase. The present Graduation Hall is to be converted into a picture gallery, and one of the approaches to the new hall will be through it. The hall itself will accommodate 1,250 persons seated. Immediately under another part is to be set apart for the purposes of a Students' Union, and will consist of a large debating hall, 55 ft. by 30 ft., on the mode of the House of Commons, with division lobbies and side galleries; also a billiard-room, 24 ft. by 30 ft., a refreshment-room of the same size, a steward's room, and a still-room, store-room, cloak-room, lavatory, committee-room, and reading-room. A Graduation Hall will be erected in the building, which will contain the anatomical museum and professors' room. The architect is Mr. Mackenzie, of Messrs. Matthews & Mackenzie, Aberdeen.

SANITARY AND ENGINEERING NEWS.

DRAINAGE SCHEMES, MITHLMOYRD, YORKSHIRE.—We understand that the Local Board has awarded the first premium, in respect of the twelve schemes submitted in public competition for the drainage of this district, to Mr. Fredk. Beesley, M.Inst.C.E., of Westminster. The scheme selected comprises the treatment of the sewage in tanks and filters, and passing the effluent over the land at the outfall, previous to its discharge into the river Calder. The estimated cost of the work is about 12,000.

THE HORNSEY LOCAL BOARD'S MUSEUM OF SANITARY APPLIANCES will be opened to the public by the Lord Mayor on the 8th inst. We gave some particulars of it in the *Builder* for June 25 last, p. 565.

INSTITUTE OF CERTIFIED SANITARY INSPECTORS.—The opening meeting of this new society will take place this Saturday, December 3, at the Sanitary Institute, Margaret-street, W.

ART-UNION OF LONDON.—The work presented this year to subscribers is an etching by Mr. R. W. Macheth of his picture entitled "Late for the Ferry"; not a work which interests us very much, but it is one that is likely to be popular, representing in a picturesque manner a kind of every-day incident, which the middle-class mind can grasp. The town seen at the other side of the river, and which forms the background of the scene, is picturesquely treated. The Council of the Society request the attention of subscribers to a special issue of a large engraving by Mr. McCulloch from Sir John Millais's interesting work called "A Souvenir of Velasquez." This is a fine engraving, though showing the old tradition of Art-Union engravings to run to an unnecessary size.

FOREIGN AND COLONIAL.

FRANCE.—The Society of Provincial Architects has addressed a petition to the Senate protesting against the system proposed by the Government for the reconstruction of the Opéra Comique. This has been granted. The eminent civil engineer, "Geh. Oberbausch," H. Hagen, has died at the age of sixty-three. He was a well-known figure at all international congresses, and enjoyed the repute of being both a great *savant* and a popular professor.

VIENNA.—Several of the series of competitions for public works to be carried out during this decade have now been opened. The competition for a scheme for the future development of the city is the most important, one for new municipal gas-works being second. Both these competitions are international. In the first, premiums of a value of 38,000 florins will be awarded; in the second, premiums to a value of 16,000 florins. Ample time is given, in the one case a year, in the other six months. Large expert juries will act as assessors.

On the 10th inst. "Baurath" Helmer will give a lecture on "Modern theatre construction and the new Zurich Theatre."

SWITZERLAND.—The controversy as to Messrs. Fellner & Helmer's design for the proposed Zurich Assembly Rooms (see "Notes," p. 391, ante) has been decided by a special commission. The charges of Zurich architects are overthrown. We hear that there will now, however, be a second competition between Professor Blunschi and the Vienna firm.

—Lucerne is to have a large new railway station.

—Basle is to have a large provisional concert-hall at the cost of 65,000 francs. It will be erected in time for a great musical gathering. A competition for the design has been opened.

is having one made of the new Memorial Church to the late Emperor William, and intends to exhibit it. No fewer than sixteen of the old Rhinish churches are being restored at present. For most of these restorations payment aid has been granted. The eminent civil engineer, "Geh. Oberbausch," H. Hagen, has died at the age of sixty-three. He was a well-known figure at all international congresses, and enjoyed the repute of being both a great *savant* and a popular professor.

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MISCELLANEOUS.

THE EDWARDS PROFESSORSHIP OF EGYPTOLOGY.—We are glad to learn that Mr. Flinders Petrie has been appointed as the first incumbent of the Chair of Egyptology founded by the bequest of the late Miss Amelia E. Edwards. There could have been no better appointment made; indeed, we may say that it was almost a foregone conclusion.

FIRE IN EDINBURGH.—By a fire which broke out in Edinburgh on Saturday last the premises of Messrs. Charles Jenner & Co., silk mercers and drapers, were totally destroyed. The premises in question occupied one of the finest sites in the city, immediately opposite the Scott Monument, having a frontage of more than 100 ft. towards Princess-street, and extending to about 200 ft. along the west side of South St. David-street. From an architectural point of view there is nothing to regret, the Princess-street frontage having consisted of the original houses of three stories and an attic, devoid of architectural features, and the ground floor having great sheets of plate-glass in iron fixings. The premises were then facing 88. David-street has been added to the original shop from time to time, and were five stories in height, embellished with composition. The buildings, estimated as having been worth 120,000*l.*, are in a tottering state, and will have to be removed, thus affording an opportunity of adding greatly to the amenity of the city. The fire is stated to have originated in the basement, about the centre of the premises, and the rapid spreading of the conflagration to have been facilitated by a lift extending from the basement to the attic. The additions made to the buildings from time to time rendered it necessary to insert many iron beams, and the heating, and consequent expansion and twisting, of these has tended greatly towards the destruction of the walls. The fire is stated to have been the largest which has occurred in Edinburgh during the last fifty years, and to have involved a loss of a quarter of a million.

MAIN ROAD ARBITRATION: BURTON-UPON-TRENT CORPORATION v. STAFFORDSHIRE COUNTY COUNCIL.—Owing to a difference between the Town Council of Burton-upon-Trent and the Staffordshire County Council on the question of the cost of maintenance of the main roads within the borough for the year 1890-91, an appeal was made by the Corporation to the Local Government Board as provided under the Act of 1888. Accordingly, on the 16th ult. Mr. Colclough, on behalf of the Local Government Board, held an inquiry at Burton on the subject. Mr. Macmorran, barrister, appeared for the Corporation, and Mr. Boddam, barrister, for the County Council. It appeared from the opening statement of Mr. Macmorran that the original amount in dispute between the authorities amounted to about 792*l.* The County Council repudiated any liability in respect of the maintenance and repair of the footpaths, and dispute also the amount claimed for the maintenance of the roads, on the ground of excessive expenditure. This the Town Council do not admit, and maintain that the County Council are liable to pay for the maintenance of the main roads (including footpaths) in such manner as the circumstances of the case require, and that it is quite unfair to compare the expenditure necessary on busy urban roads with that necessary on the ordinary roads maintained by the county, upon which basis the contribution is apparently fixed. —Mr. J. E. Swindlehurst, the Borough Surveyor, was

the first witness on behalf of the Corporation, and was under examination the greater part of the day.

Mr. Bayrs (Surveyor of West Bromwich), Mr. Hiley (County Surveyor of Nottingham), and Mr. Harley, of Stafford, gave evidence and supported the case for the Corporation. —Mr. Boddam, for the County Council, stated that the chief matters in the claim to which the county objected was the entire charge for the repairs and maintenance of footpaths, this the county repudiate; street watering, sewerage, and the charge for steam roller hire. —Mr. Boddam contended that the county was only called upon to pay such a contribution "towards" the cost of the roads within the borough as in the opinion of the County Council the roads would have cost them if maintained in the same manner as the ordinary roads of the county. Counsel admitted that the Corporation might have spent the money on the roads, as was shown by the books, —the books, like the roads, being, he stated, the best kept in the county, —still the County Council contended that the fact of the roads being urban roads did not alter the liability of the county as regarded their contribution "towards" the amount expended. The only witness in support of the county was Mr. Moncur (Chief Surveyor of Main Roads of Staffordshire). After an exhaustive investigation, the case terminated, and the Inspector will make his report to the Local Government Board.

LARGE CLOCK FOR LIVERPOOL.—A very large Cambridge quarter-clock, showing the time on four external mosaic dials 11 ft. each in diameter, and striking the hours and quarters upon five bells of the total weight of 5 tons 1 qr. 10 lbs., also driving the hands of three large dials, fixed inside the building, by an electrical arrangement attached to the clock movement, has been presented to the City of Liverpool by Mr. W. P. Hartley, and fixed in the Jubilee Tower of the Liverpool University College. It was set going by the donor on November 15, in the presence of a number of visitors. The clock and electrical apparatus were supplied and fixed by Messrs. Wm. Potts & Sons, of Leeds, who also made the large clock at Mr. Hartley's works, Aintree, Liverpool.

THE ARTISTS' BENEVOLENT FUND.—The 38th anniversary dinner of this Fund was presided over, at the "Criterion," on Saturday evening last, by Sir Edward Clarke, Q.C., M.P., and it resulted in subscriptions and donations amounting to about 500*l.*, including the Queen's annual donation of 100 guineas. The Chairman expressed high approval of the constitution of the Artists' Fund, which was established in the year 1810, and received in 1827, from George IV., a Royal Charter of Incorporation. The Artists' Annuity Fund is raised and wholly supported by the contributions of its members for their own relief in sickness or old age; it neither asks for nor receives any support from the public. All artists in painting, sculpture, architecture, and engraving, are eligible to become members. The Artists' Benevolent Fund is purely charitable, and has for its object exclusively the relief of the widows and orphans of members of the Annuity Fund left in need. During the past year 44 widows and 17 orphans received annuities amounting in the whole to 831*l.* 2s.

MEETINGS.

FRIDAY, DECEMBER 2.

Architectural Association.—Mr. John Brett on "Dry-light in the Dwelling-house." 7.30 p.m.
Junior Engineering Society.—Mr. Harry Fraser on "Water-Tube Steam Boilers." 8 p.m.

SATURDAY, DECEMBER 3.

Sanitary Inspectors' Association.—Mr. John Hutton, Chairman of the London County Council, on "An Attempt to Improve the Sanitary Circumstances of London." 6 p.m.
Institute of Certified Sanitary Inspectors.—Opening meeting. 8 p.m.

MONDAY, DECEMBER 5.

Royal Institute of British Architects.—Mr. William C. Street on "Some Problems of Town and City Developments." 8 p.m.
Surveyors' Institution.—Mr. J. Douglas Walker, Q.C., on "Rights of Way." 8 p.m.
Society of Engineers.—Mr. A. G. Dury on "The Shortlands and Nunhead Railway." 7.30 p.m.
Society of Arts (Antar Lectures)—Professor Vivian B. Lewis on "The Generation of Light from Coal Gas." III. 8 p.m.
Liverpool Architectural Society.—Mr. John Slater, B.A., on "Bricks and Brickwork." 6.30 p.m.
Leeds and Yorkshire Architectural Society.—Mr. A. Keen on "Vaulting." 7.30 p.m.

TUESDAY, DECEMBER 6.

Institution of Civil Engineers.—Further discussion on Mr. John Rigby's paper on "The Manufacture of Small Arms." 8 p.m.
Glasgow Architectural Association.—Mr. A. N. Paterson on "Colour as a Means of Architectural Expression." 8 p.m.

WEDNESDAY, DECEMBER 7.

Society of Arts.—Mr. James Dredge on "The Chicago Exhibition, 1893." 8 p.m.
British Archaeological Association.—Paper to be read by Mr. G. H. Compton, entitled "Have I Found the Roman Station of Bibracte?" 8 p.m.
Builders' Foremen and Clerks' Work Institution.—Ordinary meeting. 8.30 p.m.

decorative panels by M. Bouliard.

PARIS.—The 150th anniversary of the foundation of the Berlin "Kunstgewerbe" Museum and its Arts and Crafts Schools has been celebrated with much ceremony, the Empress Frederick, as patroness of the institution, receiving enthusiastic applause. The "Kunstgewerbe" Museum issue of the few German institutions which was started with voluntary subscribed capital and without a Government subsidy, since 1835, the collections and schools have become State property. Prior to the transfer there had, however, been some Government aid, and the collections had already been housed in their new home. Messrs. Gropius and Schmiedern were the architects of the new Museum building. Professor Lessing is curator in chief, and Professor Ewers the present master of the schools. The preliminary budget of the "Reichstax" shows that the cost of the Houses of Parliament in course of erection has now been definitely fixed. The 1,600,000*l.* already voted will officially cover the expenses for the building, but this sum does not include an extra 100,000*l.* for the interior and fresco decorations, nor some 65,000*l.* for fittings and furniture. —An extension of Schinkel's old museum has been completed in the form of a new sculpture-hall, some 90 ft. long. Its proportions and decorations are much admired, and the Renaissance sculpture which has been placed in it receives excellent light. —The great Government building for the Technical Studentship for Arabs, which is open to competition biennially, has been awarded to Reg. Bn. Otto Schmalz, Herr Schmalz, who in 1886 was noted as the youngest architect on special Government service, is known as the winner of the Schinkel Medal and many competitions. He has been on the architectural staff of the New Imperial Law Courts in Leipzig, a senior assistant to Messrs. Ende & Boeckmann, of Berlin, and is now working in the atelier of the new Houses of Parliament. A similar Travelling Studentship to painters has been awarded to Herr A. Frenz. —The post of Technical Attaché to the German Embassy in London, which has been open for some time, will probably now be filled by an architect. The post of Technical Attaché at Rome will not be filled this year. —A new book treating of Berlin architecture is to be brought out on similar lines with the existing publication on Cologne, Hamburg, Frankfurt, Leipzig, &c. The two Berlin architectural societies will work together in the matter. They have elected the editors and a committee from among their members. The editors of our two Berlin contemporaries ("Baurath" Hoesfeld and Herr Fritsch) are on the committee. —The street names are in future to be shown in black printed characters on a white enamel background, in lieu of the present white lettering on a blue background. At each corner the numbers of the houses in the block will be shown in the same way just below the street name. The question of colours for the street plates has been subject to very careful investigations. The old plates looked very neat, but were not clear enough. —The Statistical Office publishes some figures which would seem to show that the expected building crash is pending. The present population is about 3 per cent. with a tendency to decline, whilst the increase in tenements is 5-6 per cent. —Another fine model has been promised for the German architectural group at the Chicago Exhibition. Professor Schwechten

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tender to be delivered.

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Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

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PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv., vi., & viii. Public Appointments, p. xx.

Liverpool Engineering Society.—Mr. Thomas Morris on "Elementary and other Notes on Iron."

Institution of Civil Engineers of Ireland.—Meeting to be held in the New Hall, Dawson-street, Dublin.

THURSDAY, DECEMBER 8. Hornsey Museum of Sanitary Appliances.—Opening by the Lord Mayor.

SATURDAY, DECEMBER 10. Institution of Civil Engineers.—Students' visit to the Machinery and Inventions Division, South Kensington Museum, 2 to 4 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,204.—PIPE JOINT: J. R. Blamford.—This specification refers to an improved pipe-joint, consisting of a straight circular stoneware or fireclay pipe, with a composition hand run on each end of the pipe, the collar being made in two parts, named a hock and cap.

21,613.—VENTILATORS: P. N. Walker.—This invention relates to ventilators for carrying off vitiated air and the products of combustion from rooms and buildings, and is especially arranged to prevent direct inrush of cold air and to exclude rain and down-draughts.

22,036.—SASH BAR: W. D. Tucker.—This specification describes an improved anti-rattle bar, more especially applicable for greenhouses, forcing-frames, and

the like, under which plants, such as orchids, are cultivated, and where it is particularly desirable to protect the plants from the drippings of water from the gutter or cover. The sash bar is formed with rabbets on its upper side or top for receiving the glass. In the ordinary manner, and is provided on its lower side or bottom with longitudinal grooves or channels, in which any water leaking through the joints of the covering falls, and by which it is conveyed to a suitable gutter or other receptacle, or to the outside of the building or frame.

19,815.—SASH WEIGHT: G. Glasston.—The objects of this invention are to cheapen the hanging of sashes, and to provide a means of hanging both sashes, in or behind narrow window mullions. The inventor provides a weight carrying an axle pulley, or its equivalent, either concealed inside the same or attached thereto. The cord is passed round this axle pulley, and each end is attached to one of the sashes, thus hanging both sashes with one weight on each side.

15,812.—GLAZED STRUCTURES: H. J. Pullen-Burry.—This invention relates to the glazing of roofs or structures to which it may be applicable. The cross-bars, which support the horizontal edges of the glass, are made each with a groove running along its length at a small distance from the edge of this side and the upper face. The upper face of the bar is rebated along its upper lying edge, and the floor of this rebate is chamfered or beveled off towards the lower side at a slight distance from the under surface of the glass when in its place with the upper edge of the glass in the aforesaid groove, on the under side of the glass and the upper surface of the bar. This space serves to receive moisture, which may condense and run down on the under edge of the glass, and an outlet for this moisture being found by a series of number of grooves made in the outer face of the bar, and running into the rebate. The glass is retained from slipping out of the rebate by nails or screws with

sufficiently broad heads driven or screwed into the bar, so that the heads overlap the edge of the glass.

NEW APPLICATIONS FOR LETTERS PATENT. November 14—20,551, W. McGeoch, jun., Door Handles.—20,592, L. L. Loomis, Door-closing Apparatus.—20,593, F. Rose, Automatic Disinfecting Apparatus for the Seats of Closets, &c.—20,652, G. Britcher, Electric Bellpush.

November 15—20,609, W. Best, Brick Carrier.—20,623, W. & E. Freeman, Securing Window Sashes Down, &c.—20,625, J. Dawson, Planes for Carpenters, Joiners, Cabinet-makers, &c.—20,636, W. and J. Gales, Kilns for Bricks, Lime, &c.—November 16—20,708, T. Payne, Fire Casks, Stoves, Ranges, &c.—20,712, H. Evans, Waste-water Flushing Cisterns, &c.—20,745, H. Watts, Smoke-preventing Cowl.—20,747, J. Mifflin, Set Squares.—20,753, T. Mepham, Venetian Blind Suspender.—20,760, J. Neate, Chimney Top or Cowl.—20,761, E. Preston and D. Pinkey, Syphon Down, &c.—20,776, W. C. Uley, Combined Side Light or Scuttle and Ventilator.—20,781, S. Holman, Heating and Ventilating, more especially intended for use in Creating Currents for the Ventilation of Sewers.—20,791, H. Finn, Smokes-Preventer.

November 17—20,832, E. von Hunsersdorff, Bricks or Blocks for Building Purposes.—20,847, J. Knight, Radiator for Warming Buildings and Utilizing Heat wasted in Chimneys.—20,851, H. Carey and R. G. Gordon, Ventilating Apparatus for Drains.—20,861, J. Matthews and J. Noad, Manufacture of Whitelead and Coloured Pigments.

NEWPORT (Mon.)—For street formation, sewers, paving, &c., for the Newport Workmen's Cottage Company, Limited:—
 H. Wetherill £350 0 0
 R. Smith 381 8 0
 J. Liston & Co. 385 0 0
 T. Davies 372 0 0
 T. Williams 333 2 0
 Accepted.

PORTSMOUTH—For making additions to the "Bedford Hotel," Landport, for Messrs. Pike, Spicer, & Co. Messrs. Rake & Cogswell, architects, Portsea side:—
 H. Jones £1,760 0 0
 W. R. & C. Light 2,048 0 0
 Scamwell & Dowdell 1,960 0 0
 J. Crockerell, Portsmouth, 1,760 0 0
 Accepted.

SOUTHSEA—For making structural alterations to the Royal Albert Yacht Club, Southsea, and other work connected therewith, Messrs. Rake & Cogswell, architects, Portsmouth:—
 G. Cross £284 0 0
 J. H. Cooke 257 0 0
 Accepted.

SOUTHSEA—For building a private residence at Southsea, for Mr. J. A. Hobbs. Messrs. Rake & Cogswell, architects, Portsmouth:—
 Chas. Harding £208 0 0
 T. Basket 963 0 0
 J. Crockerell, Portsmouth, 730 0 0
 Accepted.

SOUTHSEA (Hants.)—For the erection of school buildings, High-land-road, for the Portsmouth School Board, Messrs. Rake & Cogswell, architects, Pavilion-tial-buildings, Landport. Quantities by Mr. Chas. H. Ball, Southsea:—
 Arncliffe & Hodgson £13 009 0 0
 W. Ward 16,200 0 0
 W. R. & C. Light 11,790 0 0
 Scamwell & Dowdell 11,700 0 0
 A. S. Porter 11,110 0 0
 T. P. Hall 11,133 0 0
 Morgan, Isidell, & Morgan 10,983 0 0
 W. Evans 410,847 0 0
 Chas. Harding 16,200 0 0
 J. H. Cooke 10,520 0 0
 T. Quick 42,267 0 0
 H. Jones 10,723 0 0
 W. Learmonth 10,410 0 0

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London & County Bank, Henley-on-Thames.—Mr. W. Campbell Jones, Architect	Single-Page Photo-Litho.

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The Poetry of Architecture.*



THE hook issued under this title by Mr. Ruskin falls in one respect exceedingly short of the scope which so wide-reaching a title suggests. "The Poetry of Architecture" is indeed one of the most inspiring and one of the most unlimited subjects that a writer on art could select to deal with. It would include the consideration of the source and meaning of the impression produced on the mind by all the varied forms which Architecture in her greatest developments has put on; the colonnades of Greece, the domes of Rome and Byzantium, the fretwork and diapers and stalactite ceilings of the Saracens, the towers and spires of mediæval France and England, the palaces of Florence and Venice, and all the other forms of architectural design which have arisen from the earth; not to speak of the subdivisions of which the subject is capable,—the poetry of plan, the poetry of decorative detail, &c.; and considering that Mr. Ruskin's sub-title indicates "the architecture of the nations of Europe" at least as his subject,—a pretty large chapter out of architectural development, one feels brought up rather unexpectedly on finding that all these large words only refer to the architecture of cottages and villas, the former more especially; the kind of architecture which a painter is willing to introduce as part and parcel of a landscape, and under no belief that he is inserting any architectural element into the picture.

The fact appears to be that this is a republication of one of the author's earliest writings, a series of essays commenced in Loudon's *Architectural Magazine* in 1837, under the *nom de plume* of "Kata Phusin" (Κατὰ φύσιν—"according to nature"), with this very comprehensive title, and intended to be carried on through

all the departments of architecture; but which, in their then projected form, did not get beyond the cottage and villa stage. The "Seven Lamps" and the "Stones of Venice" were in reality a part of the sequel which was never furnished under the original title. And in our judgment, with the exception of some brilliant and eloquent passages of prose-poetry which have almost become proverbial, the author in these more ambitious treatises went farther and fared worse. As long as he dealt with what may properly be called the poetry of architecture he had always something fine and impressive to say, though often in too rhetorical a manner; as soon as he came to expound the details of architectural style and construction he put fancies for facts, and lead his readers through pages of brilliant rhapsody which taught them nothing, or taught them wrong. In the earlier phase of his subject, which we have now presented to us again in this new dress, he had not arrived at the handling of architectural detail and structure in the full sense of those terms; he is dealing with a form of building which is hardly to be called architecture in its complete sense, and in which the interest lies not in carefully balanced mass or carefully designed detail, but in the general line and colour as considered in relation to the scene, and in a certain not easily definable sentiment, a certain national character, arising from the unconscious adoption by the builders of the construction and materials most suited to the conditions under which the dwelling had to be built. Now, of the sentiment of this kind of rural architecture there is no one who can judge better and write so picturesquely as Mr. Ruskin, and hence, notwithstanding the first dawnings of that tendency to rhetorical paradox which has been his besetting sin as a writer, we can find ourselves far more in sympathy with him in these early pages of his architectural criticism—a remarkable production indeed for a youth of eighteen—than in the more brilliant but often fantastic criticism of his later and more celebrated works.

Nothing could be better put than this, in the opening paragraph of the introduction:—

"If we consider how much less the beauty and majesty of a building depend upon its pleasing certain prejudices of the eye, than upon its rousing certain trains of meditation in the mind, it will show in a moment how many intricate

questions of feeling are involved in the raising of an edifice; it will convince us of the truth of the proposition, which might at first have appeared startling, that *no man can be an architect who is not a metaphysician.*"

The italics are our own, and the sentence so emphasised is a brief expression of a truth which applies equally to music and ornament, the two other metaphysical arts, as distinguished from painting and sculpture, which are physical arts. In all these three arts the designer is dealing with ideals which are not expressed in visible nature, but which are only apprehended by thought; and consequently the right or wrong of a design in any of these metaphysical arts has to be judged not by the standard of natural form, but by a mental standard, arising out of a process of comparison of the means to the end. It is very probable that this opinion will be found to be directly contradicted in some later writings of the author; and it may be added that metaphysical reasoning has not so much to do with the criticism of the naïve forms of architecture considered in this hook, as it has with more finished architectural design; but for all that the sentence here quoted embodies a positive and most important truth as to the intellectual position of architecture which is worth drawing special attention to, and which (again) is a remarkably thoughtful utterance for so young a man as Mr. Ruskin then was. It is for want of this reference to a metaphysical ideal that there is often so much uncertainty and difference in regard to architectural criticism, and that architects themselves (the younger generation especially) are so much governed by fashion and prejudices in their liking and disliking of architectural designs; now one type of architecture is the favourite, now another, and what does not conform to the immediately favoured type is scouted; whereas the whole right and wrong of the thing, æsthetically, is a matter of thought and reasoning, and what was good in architecture at one time is good at another, independently of fashion, excepting so far as the circumstances of life or climate may have altered.

In entering on his subject the author first considers the lowland cottages of England, France, and Italy, in order to show the manner in which these small and unsophisticated buildings express or harmonise with the character of the countries in which they

* The Poetry of Architecture; or the architecture of the nations of Europe considered in its associations with national scenery and national character. By John Ruskin. With illustrations by the author. George Allen; London and Orlington; 1833.

are respectively situated. The cottage gives animation and human interest to the rural scene without in any way disturbing its character. And he finds that as the retiring aspect of the English cottage, and its characteristic neatness, are in harmony with a scenery which is on a small scale: so in France, where the country is more hare, and the scenery on a larger scale, uninterrupted by hedgerows, the French cottage (when we can find one) is naked and hare in comparison; "the entrance is always open; no roses, or anything else, are wreathed about it; several out-houses, built in the same style, give the building extent; and the group . . . stands comfortably between two individuals of the column of long-trunked fac-simile elms, which keeps guard along the length of the public road." The French cottage, he considers, though it cannot please by its propriety, gains interest by its substantial style and a certain evidence it gives of having once been fitted for the residence of prouder inhabitants, "of its having once possessed strength, which is now withered, and beauty, which is now faded. This sense of something lost, something which has been and is not, is precisely what is wanted. The imagination is set actively to work in an instant."

The succeeding chapter on the Italian cottage is full of beautiful writing, beginning with the special characterisation of the country (without considering which we cannot understand the buildings):—"the sadness of Italy's sweet cemetery shore":—

"Every part of the landscape is in unison; the same glory of morning is thrown over the whole; the deep blue of the heavens is mingled with that of the everlasting hills, or melted away into the silence of the sapphire sea; the pale cities, temple and tower, lie gleaming along the champaign; but how calmly! No hum of men, no motion of multitude in the midst of them: they are voiceless as the city of ashes. The transparent air is gentle among the blossoms of the olive; and the small fountains, which, in any other land, would spring merrily along sparkling and surging among tinkling pebbles, here flow calmly and silently into some pale font of marble, all beautiful with life, worked by some unknown hand, long ago powerless, and fall and pass on among wallflowers, and scented opeas, through cool leaf-lighted caves or gray Egerian grottos, to join the Tiber or Eridanus, to swell the waves of Nemi, or the Larian Lake. The most minute objects (leaf, flower, and stone), while they add to the beauty, seem to share in the sadness, of the whole."

It is difficult to know whether to admire more the truth of the sentiment here, or the beauty of the language, a perfect bit of prose-poetry. One has only to reflect a moment to feel how completely at variance would be the English cottage here. An equally fine landscape passage follows, dwelling on the elevation of sentiment of the Italian landscape, in spite of its melancholy. And in such a land what do we expect of the cottage? Not neatness, but "a beauty, no matter how dilapidated, which may appear to have been once fitted for the surrounding splendour of scene and climate." The author might have made a reference here to Goethe's charming little poem in which the Italian peasant invites the poet to his home, and he finds it nestled between the remains of two great temple columns. Concerning the Italian cottage itself, the author remarks on its suitability to its circumstances its low-pitched tiled roof, so that instead of appearing at a distance, like the English cottage, all red roof, it seems all white wall, with the dark shadows from the projecting roofs lying on them, the roofs which are projected for a purely practical reason, to keep the heat off the walls and the windows; and "these long oblique shadows on the white surface are always delightful, and are also sufficient to give the building character." Various other points of special character, all arising out of local influences, are followed out in the succeeding pages, the whole of which are both true in themselves and expressed in the most felicitous manner. The Swiss mountain cottage is analysed in the same manner, and then we return home once more to the Westmoreland mountain cottage,

with its door "flanked and roofed by three large oblong sheets of grey rock whose form seems not to be considered of the slightest consequence;" a touch which almost in itself brings the character of the dwelling before us. We object to one assertion in this chapter, made *en passant* as an illustration, to the effect that "anything which to the eye is split into parts, appears less as a whole than when undivided." Not less in apparent dimensions, certainly; all architectural experience and observation is to the contrary: it may have less expression of weight and mass.

A succeeding "Chapter on Chimneys" is piquant and interesting. The dignity of smoke, says the author, is now better understood than in barbarous ages; "it is dismissed through Gothic pinnacles, and (as at Burleigh House) through Tuscan columns, with a most praiseworthy regard to its comfort and convenience. Let us consider if it is worth the trouble." The first position laid down is that smoke is worth something in a cottage, where it is seen against trees or other background, when it assumes a silvery grey tone, and gives the charm of silent movement, but in more ambitious buildings it is only seen dark and sooty against the sky, and is an eyesore. Consequently, decorated chimneys are never to be approved, as they are out of place in the cottage, and in the mansion it is no use drawing attention to that which is a drawback. Perhaps it would not be difficult for an ingenious person (even for Mr. Ruskin himself) to reason the other way about; but after all, as the Fool in "Lea" says, "it is a pretty reason." But to come to the design of chimneys, where there is no attempt to make them too decorative—we are given a series of small sketches of chimneys of different nationalities, and a critical comparison of their merits. The architect will find some suggestive remarks in this; we can only here observe that we quite agree with the author in preferring the three English examples of cottage chimneys to any of the others, as being more simple, more directly obvious in their object, and consequently more truly picturesque than any of the foreign examples. Generally speaking, the author's conclusion is that the form of chimney which attracts least attention is the best. This would be a sad blow to some of the builders of modern Elizabethan houses; but we observe that with a good many of our best architects at present there is a growing feeling in favour of the simple treatment of chimneys.

The chapter on the relation of cottage building with varying characters of landscape in the same country, contains remarks worth attention, though we differ utterly from the dictum that while white in shade (in a cottage in a woodland country) is allowable, "if visible at any point more than 200 yards off it will spoil the whole landscape." How many instances to the contrary could be brought, both in pictures and in actual scenes.

We proceed to the consideration of villa architecture; and in regard to the Italian villa will only pause to note one acute remark, to the effect that this is a heritage from the time when Rome kept the whole Italian peninsula in order:—

"Such a building could not exist in Greece, where every district a mile and a quarter square was quarrelling with all its neighbours. It could exist, and did exist, in Italy, where the Roman power secured tranquillity, and the Roman constitution distributed its authority among a great number of individuals, on whom, while it raised them to a position of great influence, and, in its later times, of wealth, it did not bestow the power of raising palaces or private fortresses. The villa was their peculiar habitation, their only resource, and a most agreeable one; because the multitudes of the kingdom being, for a long period, confined to a narrow territory, though ruling the world, rendered the population of the city so crowded, as to drive out its higher ranks to the neighbouring hamlets of Tibur and Tusculum."

He goes on to remark that in very perfect Monarchies, "such as Austria," the power is

in the hands of a few who build themselves palaces rather than villas, while in perfect Republics "the power is so split among the multitude that no one can build himself anything." The United States must on that score be a very imperfect Republic, but it must be remembered that this was written over half a century ago. When we come to the English villa, we find a discourse in the first instance on "Principles of Composition," which certainly is calculated to excite curiosity. The first principle insisted on is that a man who builds a country house should, in regard to the outside of the house, think of his neighbour's taste more than his own, since the outside of the house concerns them much more than it concerns the man inside. There is a good deal of truth in this, though it is carried a little too far for serious earnest. The chapter contains other remarks which are suggestive in a sense, and it is all sufficiently original to be worth reading on that account alone, but the "principles" are not very obvious, and of the three windows given to illustrate three different treatments, we can only say that they are all equally ugly; these are reprints from the cuts which accompanied the original papers, and it is a pity they were revived.

There are some admirable remarks on brick houses, which are praised for many qualities; air of respectability, incapability of looking absurd, adaptation to the climate; but all this is only in one class of plain cultivated country, where these qualities of brick "atone for its ugliness" (odd to read in the present day); once in a more picturesque country and "we take leave of brick for ever." We quite agree however with the objections against "stone dressings." In undulating country, or what the author calls the "picturesque blue country" (cultivated country) as distinguished from the "simple blue" country (where we may have brick), the buildings should be square and massive, which we think is true; and the author remarks that about this class of English country there is a good deal of the character of Greek landscape, and hence Greek lines of building may be expected to go well with it; "nothing can excuse one acute angle, or one decorated pinnacle" which is a bit of the author's habitual exaggeration: but the view maintained is true in the main. In woody, or what he calls the "green country," Elizabethan or something analogous is to be preferred; but we may observe that this depends very much on the nature of the trees, which influence the lines of the landscape a good deal. A remark as to the building may be quoted:—

"The building must be either quite chaste, or excessively rich in decoration. Every inch of ornament short of a certain quantity will render the whole effect poor and ridiculous; while the pure perpendicular lines of this architecture will always look well if left entirely alone. The architect, therefore, when limited as to expense, should content himself with making his oriels project boldly, channelling their mullions richly, and, in general, rendering his vertical lines delicate and beautiful in their workmanship; but if his estimate be unlimited he should lay on his ornament richly, taking care never to confuse the eye."

We do not like the expression "lay on," but in its general sense the advice is sound, and reminds one of Sir Charles Barry's opinion that a building could not be too richly decorated as long as every part was carried out on the same relative scale of richness. The one or two diagrams made out for illustrating the composition of the lines of the villa in regard to those of the landscape, and many of the rather rambling reflections on this subject, are of little practical value, and rather savour of riding a hobby to death; but some of the suggestions will bear consideration, and the main principle, that where the lines of the landscape are vertical the building should be horizontal, and the converse, is clearly kept in view.

The illustrations are an important part of the attractiveness of the book; these are nearly all reproductions, very well executed, from new or at least unpublished sketches of the author, and though their relation to the text is not always very obvious, they are

* "Azure pillars of the hearth Arise to thee."—Tennyson.

charming in themselves; indeed we have always considered that if Mr. Ruskin had chosen to write less and paint more, he would probably have been one of the foremost artists of the day, as he is certainly the foremost architectural sketcher. The literary portion of the book however, was well worth preserving and re-issuing, and we are only too glad to be able to find ourselves so much more in sympathy with the author in this than in some of his later and more ambitious works on architecture, in which he has handled in dictatorial style, and with an ever-increasing passion for rhetorical paradox and exaggeration, subjects which he only half understood and on which his opinions seem never even to have been settled. The present charming volume is a welcome exception in this respect. We may add that the publisher has done everything for it in the shape of fine paper, type, and margins of noble extent.

ANTHRACITE COAL.

THE subject of fire and fuel is being discussed in our correspondence columns, and the question again raised as to the possibility of meeting the smoke difficulty by the general use of anthracite. As we have already suggested in a comment on a letter printed last week, the question (or one main question) is whether, supposing that the general use of anthracite would be an entirely satisfactory solution in itself, there is likely to be enough anthracite available to keep up the supply for any practically unlimited period, and whether it could in that case ultimately be supplied at the present price of bituminous coal.

It is impossible to give even an approximate estimate of the amount of workable coal at present lying in the strata forming the earth's crust,—our knowledge of the geology of many countries is too meagre; therefore, the resources of coal in the world are unknown. It is true that we can form a fair idea of the geographical positions of the various coal-basins (except in regard to unexplored regions), but, as a rule, the actual extent of these basins, and the number and quality of the coal-seams contained therein, are problems as yet unsolved. Even in civilised countries, where geological surveys have been carried out as accurately as may be, the resources of many coal-fields are only arrived at by mere guesswork. Under the circumstances, it would be futile to attempt to estimate the amount of either anthracite or bituminous coal available as supplies to be drawn upon. Judging, however, from the known occurrences of both these fuels, and from our knowledge of their respective modes of origin from a geological point of view, it is practically certain that there is but a very small proportion of anthracite as compared with the bituminous and other coals in the world. If we take the British Isles as an example we find that the only districts where anthracite occurs in any abundance is in the South Wales coal-field, Kilkenny in Ireland, and Linlithgowshire in Scotland. Only in the first-mentioned district is it present in large quantities, and it is there confined to the western part of the coal-field. Thus the remaining coal-basins of the country from which we at present draw our chief supplies are not available for the supply of anthracite. Anthracite occurs in Belgium (notably at Mons), France, Spain, Saxony, Russia, and other parts of Europe, and it occurs sparingly also in the gigantic coal-fields of Australia and elsewhere, but the greatest development of the mineral is in the United States. Large as is the area occupied by anthracite there, however, it sinks into insignificance when compared with the areas occupied by the bituminous coals. These latter are found in the United States over an area of more than 220,000 square miles* (excluding the extensive coal-basins in the Rocky Mountain region and along the

Pacific coast); whilst the anthracite coal occurs only in Pennsylvania, New England, Colorado, and New Mexico,* and occupy an area of 985 square miles only,—and these are the largest beds of anthracite in the world. The total output of coal in the United States in 1890 was 157,788,656 short tons, and of this about 47,000,000 short tons was anthracite, showing that the latter mineral is much in demand.

The use of pure anthracite in domestic fire would, no doubt, greatly tend to abate the smoke nuisance. In a strong draught it burns without fusing, smoking, or smelling, and gives out a great heat. It kindles with much difficulty, but this may be largely overcome by breaking it up into small pieces,—as is done in the United States. In regard to its non-smoke-producing qualities, this important factor may be considerably modified by the composition of the anthracite. This mineral passes by insensible gradations into the bituminous varieties of coal, an intermediate stage being furnished by the semi-bituminous steam coal of South Wales. If a very large demand for anthracite were to be created, we should doubtless find plenty of the inferior or semi-anthracite kinds (which are by no means smokeless) selling in the market as the real commodity.

Coming to the main question, it seems very doubtful whether, from the practical point of view, the public would submit to be compelled to burn only anthracite as fuel. The demand would be such that its price in England must become almost prohibitive. We should certainly have to import large quantities from the United States, to the detriment of our own coal industry. If anthracite occurred more abundantly in this country, we should be only too glad to acquiesce in the views of our correspondent; as it is, we are afraid his suggestion will not generally be entertained.

NOTES.

THE first meeting of the London Reform Union is announced to take place at Exeter Hall on the 15th, under the presidency of Lord Rosebery. From some of the "leaflets" of the Union which have been sent to us, it appears that part of its proposed work is to assist working men and others who occupy houses at low rents in compelling landlords to keep the houses in sanitary condition. This will be a good work, no doubt, but it is to be hoped that the Reform Union will recognise that others besides working men require alterations in the present law as between landlords and tenants. The leaflet entitled "Is your house healthy?" draws attention to the fact that when a man takes a house at over 20l. a year he takes it at his own risk, while if the rent is under that amount the landlord is obliged by law to warrant the place as reasonably fit for human habitation; but the Reform Union does not think it worth while to make any comment on this monstrous anomaly. In short, as far as the information sent to us goes, the Union seems to be established mainly in the interests of the working man, and from the name on the hill announcing the meeting it would appear that it is to a considerable extent a political movement. The politics may be our own, but we are not the less of opinion that reform in matters connected with the sanitary condition of life in London has nothing whatever to do with political partisanship, and if the London Reform Union is to be conducted on political lines it will neither be a success nor command general confidence.

WE much regret to notice that the London County Council has shown itself so weak and irresolute in regard to a memorial from the Vestry of Kensington which came before their last meeting, urging the Council

to apply for powers to control and regulate itinerant musicians, street noises, and other similar annoyances in London. In spite of strong support from several members, the proposal was shelved, apparently because the County Council has not yet got that control of the police which it is hungering after, and pretends that it cannot therefore enforce by-laws on the subject. This is a mere subterfuge, as it is perfectly certain that if such by-laws were made the police authorities would support them, and the decision arrived at on Tuesday is very discreditable to the common sense of the majority of the County Council. The nuisance of street noises in London is a crying evil, which ought to be taken in hand and dealt with strongly, and the County Council has held its hands and refused to deal with it on a mere *doctrinaire* theory of police control.

FROM the last quarterly report of excavations at Athens (*Mittheilungen*, November, 1892), we learn that the works began last autumn and continued during the spring round about the Areopage and Pnyx have been set in hand again this month. A further portion of the old Panathenaic road has been laid bare in the south-easterly direction, *i.e.*, higher up towards the Acropolis. It is found that on both sides it is bounded by the foundations of ancient buildings, of which, in some cases, the houndary stones have been discovered, so that it is not too much to hope that very shortly we may hear of the discovery of some definite building known to classical literature,—if one absolutely fixed grant can be got we shall probably hear no more of the "Enneakronos episode." The excavation is being carried on by the German School. The Greek Archeological Society is at work in the sacred city of Eleusis, and is just now digging near the Monastery of Dalphi. Unfortunately, the hope cherished by the excavators that they had found the *hieron* of Apollo, mentioned by Pausanias (*L. 37, 6*), has proved to be ill-founded. Corinth so far has been an almost wholly neglected field, but the Archeological Society is at work there also, under the skilled direction of Mr. Skias. The object proposed is to free the site of the ancient Agora. So far this has not been done, but the excavations already show that the Byzantine structures and the classical work beneath them are in far better preservation than was at first feared. The remains discovered were so effectually covered by accumulations of earth that not a trace was visible when the excavations began. There seems every prospect that the topography of the town will be completely made out.

WE hear that Mr. Percy E. Newberry, with a staff consisting of Mr. Percy Buckman (artist), Mr. John E. Newberry, A.R.I.B.A. (architect), and Mr. Howard Carter (draughtsman) is leaving England this week for Upper Egypt to carry on the archaeological survey under the auspices of the Egypt Exploration Fund. The great capital of Tel-el-Amarna will be the main seat of operations for the coming season. The private work of Prof. Flinders Petrie during last winter has elucidated many points relating to the city itself, but the numerous rock-cut tombs of courtiers of the heretic king, with their abundant scenes and inscriptions, still await a thorough survey, and promise to throw much light on the official creed and mode of life in a remarkable epoch of Egyptian history.

WE hear that at a meeting of the Society of Antiquaries on December 1 the following resolution was proposed by Sir John Evans, seconded by Sir Charles Robinson, and carried unanimously:—

"The Society of Antiquaries hear, with great regret, that considerable portions of the cathedral church of Lichfield, the work of Bishop Hackett after the sieges of the Great Rebellion, though substantial and well-looking, have been replaced by modern imitations of supposed thirteenth-century

* See "Mineral Resources of the U.S., 1889-90," pp. 149-7 (just issued).

* There are a few minor patches scattered here and there in the States.

work, thereby destroying the traces of one of the most remarkable epochs in the history of the Church of England.

The Society is also informed that further destruction of good seventeenth-century work is in contemplation, and ventures to earnestly urge the Dean and Chapter of Lichfield not to permit any such destruction to take place."

Whether the particular work which it is intended to remove is such as ought to be preserved on architectural and archaeological grounds, is a matter on which we must decline to express an opinion without fuller information and a visit to the cathedral; but if it is so, we fear the appeal of the Society of Antiquaries will fall on deaf ears. It was a well-known Canon of Lichfield, it may be remembered, who amused himself by writing a Latin poem in praise of Lord Grimthorpe's architecture, which caused the latter so much joy that he could not forbear flourishing the fact in print, although, as we pointed out, it was only an offering of family devotion. But the architectural atmosphere of Lichfield is Grimthorpean, and we know what that means.

A SERIES of ten decorative pictures occupying the long panels (which virtually take the place of a triforium) between the nave arcade and the clearstory of St. Peter's Church, Plymouth, are to be executed by Mr. E. A. Fellows Pryne, and deal with events in the life of St. Peter. One of these is about to be fixed, and will occupy one of the bays on the north side of the church. The picture has been painted in oils on canvas in the usual manner, and will be fixed to the masonry. As it will be some considerable height from the ground (about 30 ft.) when fixed, the figures—and, in fact, the whole design—has been treated with a good deal of breadth, and the colouring, which at present looks somewhat vivid, will no doubt also be considerably toned by the more subdued light of the church. At either end of the picture is a smaller panel containing a shield charged with the keys of St. Peter, and a scroll with the title of the central subject—in this case, "St. Peter Confessing the Lord is Christ." The whole is about 16 ft. in length.

LAST summer, Professor von Helmholtz, with certain of his assistants, visited England for the purpose of making exact comparisons between the electrical units in use in England and Germany, and of attending the Edinburgh meeting of the British Association. At this meeting the whole subject was fully discussed in the presence of several members of the Electrical Standards Committee, Dr. Guillaume, of the Bureau International des Poids et Mesures, and Professor Carhart, of the University of Michigan, U.S.A., being also present, as scientific representatives of their respective countries. The result of the discussion has been a slight modification of the resolutions of the Electrical Standards Committee, published in Monday's *Times*, as a supplementary report to the President of the Board of Trade. The chief changes are that the standard of resistance is defined as that of a uniform column of mercury of given length and mass, instead of, as formerly, of given length and cross section; that the solid metal standard is to be from time to time verified by comparison with a column of mercury of known dimensions; and that the British Association unit, though still defined, as before, in terms of the new unit, is no longer to be used as a standard of comparison. The temperature at which the Clark cell is to be used as a standard of pressure is now expressed in degrees Centigrade, and the limit of error has been more exactly defined. Mr. Mundella will not, however, find his bewilderment as to the meaning of the alternating ampere in any way diminished, its definition standing in the new resolution exactly as in the old. It is to be hoped that the labours of the Committee will result in that

international agreement respecting the standards employed, which is of far greater practical importance than even theoretical accuracy in the determination of the above standards. The scholastic instinct of the *Times* reader is, doubtless, responsible for the reappearance of the grave accent in such words as "ampere" and "centimetre," though it was deliberately rejected by the Committee on the ground that these are now English words.

THE discussion at the London School Board last week on the subject of "insanitary and dirty schools," though there was a good deal of difference of opinion expressed, constituted practically an admission that some of the Board Schools were in a discreditably dirty condition, and the Rev. S. Headlam was quite in the right in his remark that the more dirty were the children attending the schools the more necessary it was that the schools should show an example of cleanliness. The defence set up for the schools was that they were painted and cleaned once in eight years, according to what appears to be the requirement of the Board. Then we should certainly say that is not often enough, and that the requirement should be reconsidered and altered. At a later point in the proceedings, the Rev. E. Coxhead brought up what may be considered one of the latest illusions of the day, that a public body like the School Board could effect a saving of expense by building their own schools and dispensing with the intervention of the contractor. This is one of the foolish cries of the day, for which the London City Council has set the example. Mr. Coxhead, as he was very plainly told, showed utter ignorance of the practical conditions of building, and seemed to be quite unaware that a large initial expenditure in building plant must be a necessary condition for any such undertaking. The feeling of the more reasonable of those who spoke in partial support of the proposal was that, inasmuch as another public body had decided to try the same course, they would be wise at least to wait and see what was the result of that experiment. Eventually the motion was negatived by 35 to 9.

IT is not unprecedented that, when a fire light, its origin should be attributed, on little or no evidence, to electricity. The remarkable point about the fire of last month in Regent-street is that electrical engineers are amongst those most anxious to show that it arose from over-heated wires. The explanation of this circumstance is to be found in an interesting correspondence in the last two numbers of the *Electrician*. For some time past many electrical engineers have been in favour of earthing one of the conductors in certain systems of distribution; it is done in the Ferranti high-tension system, and in New York the Edison Company have for some time past earthed their middle wire; but the opposition of insurance companies, the caution of the Board of Trade, and the want of agreement amongst experts, has made the general adoption of this plan almost hopeless. The Regent-street fire, however, and the comments on it by Mr. Human, have put the question in a new light, and it is at least open to argument that increased safety would be obtained by earthing one main. Mr. Human shows clearly that it is possible that through leakage a fire may arise, even when the current is turned off, unless, indeed, double-pole switches are everywhere used, which is, in many cases, impracticable. A multiplication of safety-fuses would, indeed, guard against this danger, but not against the serious loss from unsuspected leaks which are yet not of sufficient magnitude to blow the fuses. No doubt the ideal system is to insulate both conductors, and maintain their insulation at a high figure, but experience has shown that this is not attainable, at any rate for long. The companies may secure it in their mains,

but the houses are not equally under the control; a leak may arise after the house installation has been tested and passed, and may be for a while of no consequence; leak on the other main in another house may suddenly make it dangerous, or at least lead to a letter to the *Times* on the untrustworthy character of electrical meter. With one main earthed, faults may still occur; but they are almost certainly detected as soon as they arise, and are, therefore, much more easily remedied, though, no doubt, more serious at the time. The prejudice against this plan probably arises in part from confusing it with an earth return, and also from a fear that dangerous shocks would be more common if one conductor were always connected to earth. The latter danger is entirely obviated by the use of concentric conductors with the "live" wire inside; while as to the former objection the difference between bringing the current back by a conductor nearly at the potential of the earth, and turning it loose to find its way back by gas or water pipes, or how it can, is, surely, not a difference that needs to be insisted on. They remain, however, two difficulties which will require most serious attention from the advocates of earthing conductors, viz., the danger to the cable itself, and to any metallic material near it, of injury by electrolytic action; and unless the cable is earthed at one point only, the impossibility of confining the return current entirely to the conductor.

IN many towns in the United States the mechanical means of operating street railways have all but entirely superseded horse traction, and that with great advantage to the inhabitants in many respects. Where electric or cable cars are running, the passengers can be carried with quickness and certainty to almost any part of the town. The cars travel at a far higher speed than would be tolerated in this country, but accidents are by no means frequent. People get accustomed to the rapid approach of the vehicles, and take care to get out of the way. There is this advantage with street railway, that one knows exactly where it is coming. It keeps a definite track and does not wander all over the road like the unwieldy omnibus, nor does it dash across unexpected crossings after the manner of the more active hansom. It does not present seem likely that we shall ever see mechanically propelled cars travelling as speed in our own crowded streets, but it must be remembered that the street railway would be not an addition to the present omnibuses and cabs of London, but a substitution for them. In America, the cars run so quickly—with no stoppage at street-corners and loiterings from point to point, after the manner of the London omnibus,—but cabs are superfluous for ordinary purposes, and this is rendered more absolutely the case by the perfect system of "expressing" baggage in vogue in America. If our highways were cleared of omnibuses and nine-tenths of the cabs,—especially "crawlers,"—it is wonderful what clear streets we should have. One remembers the almost deserted appearance of our thoroughfares during the recent strike of the omnibus men. Broadway, the chief artery of traffic in New York, is to be operated by a cable line, and it is considered by many in the United States that horse cars will soon be a thing of the past, excepting in certain special cases. The point that remains to be decided by Americans is whether cable traction or electricity will survive as the fittest. The former was long supposed to have the advantage of cheapness, but recent investigations appear to negative this. At a recent convention of the American Street-railway Association, held in Cleveland, Ohio, a report was read in which this subject was dealt with on the basis of actual experience, when it was shown that while an electric road will pay a little over 7 per cent. per annum, a cable-road, under the same circumstances, would pay something over 5 per cent. per annum. In connexion with this matter

it may be stated that 89 per cent. of the electric roads of America are paying dividends of from 5 per cent. to 12 per cent.

IN a communication made by Dr. W. Jordan, L. quoted in the current volume of the "Transactions" of the Institution of Civil Engineers, the construction of stands for levelling instruments is discussed. In levelling, the instrument has to be set up more frequently than in surveying, and, therefore, any small saving of time is important. For levelling along high roads and towns, Dr. Jordan found it saved time if he inserted a not over-sensitive spirit-level in the top of the tripod. By moving the legs, it is easy to bring the bubble to the centre, and this can be trusted to the assistant. For levelling the instrument itself, merely a few turns of the screws will be required, since by the preliminary adjustment of the tripod legs everything has already been brought nearly to a horizontal position. This method is unsuitable, unless firm ground can be found for each leg. In the latter case Dr. Jordan finds useful a tripod with adjustable slotted legs, fitted with a circular level. Other methods have been devised to the same end. Gellemand has introduced a half-joint in the tripod head. Another way is to place the level on a plate supported above the tripod head by three coarse adjusting screws. It is better to use two tripods, each in turn being taken on ahead to be adjusted by an assistant. In this way Dr. Jordan was able to level a railway at the rate of one mile an hour with a mean error of 0.13 in. per mile.

THE Ruabon Brick and Terra-cotta Company have gained a second victory over the Great Western Railway in an appeal case heard before Lords Justices Bowen, Lindley, and A. L. Smith on the 6th. The case is that the plaintiffs conveyed to the defendants the surface of a portion of their land, under which was some valuable clay still unworked, and which the plaintiffs retained the right to work for their manufacture. Subsequently the plaintiffs commenced to mine this clay, and in so doing went on the surface of the ground which they had conveyed to the railway company, which the latter endeavoured to put a stop to. The court, however, upheld the previous judgment, that as the railway company had declined to buy the land outright, and the Ruabon Company had retained the right to work the clay, they had the right to use all the usual means necessary to work it, and the appeal was dismissed with costs. It would certainly appear that the conveyance of the surface of the land to the railway company was in that case of rather an illusory nature.

ACCORDING to an American technical paper—*Engineering News*—the hub and shaft of the "cable-wheel" for the new power-house of the Broadway Cable weighs about 40 tons. The fact is interesting in itself, but more so from the light thrown, by its passage through the streets, on the state of New York pavements. The forging was taken on a wagon dragged by twenty-six horses. The load was about 10 tons per wheel, and in some places the paving was depressed nearly one foot. "This," our American contemporary says, "does not speak well for our pavements." Not only does it not speak well for pavements, but it does not speak well for the road-making from top to bottom. The same remark applies to the municipal authorities. Further west, however, the citizens are better served. In St. Louis, some time ago, a reel of wire cable was taken in a wagon over the new "Telford Pavement," the load being nearly 14 tons per wheel, and caused no depression of the surface. It would, of course, add to the value of this information if we knew the dimensions of the wheel tyres.

THE correspondents in the *Times* on advertisements has drawn some amusing letters from some of the most valorous

advertisers of the day, who seem (or pretend to seem) quite unable to understand why any one should object to their monstrosities, and who have endeavoured to draw a red herring across the scent by pointing out that periodical literature cannot be carried on at its present cheap rate without advertisements. No one has denied or pretended to deny that; what is complained of is the intrusion everywhere of vulgar and glaring pictorial advertisements, of which the apologists for the system are the persons most guilty. Mr. Waterhouse, in a second letter in the *Times* of December 2, points out, in regard to the tumult of advertisements at railway stations and along railway lines, that the companies should remember that "they did not get their powers to act as advertisement agents, and disfigure the countries they pass through."

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE third ordinary general meeting of this Institute for the present Session was held on Monday evening last at Conduit-street, Mr. J. Macvicar Anderson, President, in the chair.

The New Honorary Secretary.

The President said that as they all knew, they had lost the services of a valuable official as honorary secretary in Mr. Aston Webb; but they had the pleasure of having with them that evening their new honorary secretary, Mr. William Emerson, and he thought that the members would like to accord him a hearty welcome as he was entering on his duties. (The President's remarks were received with applause.)

Mr. Emerson said he was very sensible of the honour which the members had done him in electing him to take the post of honorary secretary. While he could hardly expect to fulfil the duties of the office as well as his fore-runners the President and Mr. Aston Webb, he could only say that he would use his best endeavours to deserve the confidence that had been reposed in him.

The Examinations.

The President next made a statement with regard to the Examinations recently held by the Institute. He said he had much pleasure in reporting the result of the Preliminary Examination held in London, Manchester, and Bristol on November 15 and 16. As had already been mentioned in the *Institute's Journal*, 97 applications were made for entrance to the Examination, of which 92 were new applications, the remaining 5 being candidates relegated to their studies at previous examinations. Of the 97 applicants, 40 were exempted in accordance with the regulations, 35 passed, 5 were relegated to their studies (4 in all subjects and 1 in certain subjects), 2 did not pass, and 15 either withdrew their applications or did not present themselves. Thus with the 40 exempted candidates 75 had passed and had been registered as Probationers. The President then read the names of the successful candidates, whose ages, he mentioned, ranged from 16 to 26 years. In reference to this examination, the President said he was glad to be able to inform the Institute that for the first time since the establishment of the Preliminary Examination, six out of its eight subjects had been trusted to a professional examiner, who had set the questions and marked the answers. The assistance thus obtained had proved so valuable that it would be sought in future Preliminary Examinations. The result of the *Intermediate Examination* held in London on the 15th, 16th, and 17th of last month had been announced by him at the last meeting. Of 30 Probationers who applied for entrance to the examination, 24 were accepted, and 13 passed and were admitted. The Examination in Architecture, to qualify for candidature as Associate of the Institute, was held last week in London, 50 applications were received, of which 10 were from candidates relegated from previous examinations; 9 were not accepted, and 5 others either withdrew their applications or did not attend. Of the 30 who were examined, 8 had been relegated to their studies in all subjects, and 14 others to their studies in certain subjects; therefore only 12 passed the Examination,—exactly one-third

of the number of candidates examined. The names of the successful candidates were:—

Allen, T. A. (London).
Brakepear, H. (Orsham).
Cresswell, J. J. (Grimsby).
Cummiug, W. N. (Edinburgh).
Hill, A. R. (Bradford).
Johnson, W. E. (London).
Jones, J. H. (London).
Kath, J. M. (London).
Ryan-Tenison, A. H. (London).
Sargent, L. E. A. (London).
Ward, W. H. (London).
Waterhouse, P. L. (London).

He regretted to note that the Board of Examiners had been compelled to delegate to further studies an unusually large number of candidates, on account of the unsatisfactory quality of the work done during the written, oral, and graphic examination. As the standard of excellence had not been raised, the Board could only attribute the result to the want of proper study on the part of those who had been unsuccessful, who seemed to have given preference to the more popular manuals, to the neglect of more important works. The best thanks of the Board of Examiners and of the Institute were due to the Bristol and Manchester Societies for the assistance rendered by them in connexion with the Examination.

The Ashpitel Prizeman.

The President announced that from among the sixty-one gentlemen who had passed the Examination in Architecture during the past year, Mr. A. C. Houston, of London (a pupil of Mr. James Edmeston), had been awarded the Ashpitel Prize, which consists of books to the value of 10l. 10s. Mr. Harold Brakepear, of Manchester, having been specially commended by the Board of Examiners, had been awarded a prize of books of the value of 5l. 5s.

Mr. William C. Street then read a paper on

Some Problems of Town and City Development

After a few introductory remarks, the author said the subject of open spaces might be considered more a sanitary or a surveyor's question than one for architects; but that was hardly so, as the extension of building generally created the necessity for open spaces, and therefore new buildings should be designed with regard for open spaces. Modern practice, until the last few years, had been too much the opposite. In the extension of any large city, architects and public authorities should show more consideration for the surroundings and requirements of the population, and should work in accordance with an approved plan for the future development of such city. A great enemy to any such beneficial development had been the land-grabber, who, having purchased land in the outskirts, planned as many streets as possible for the sake of the ground-rent. It might be said that this did not affect architects, but he considered it was within the power of architects to advise or influence public bodies, and to so direct public taste, that enactments might be passed providing for the development of cities in accordance with a recognised and wholesome scheme. Good main thoroughfares, with ornamental and recreative open spaces at convenient distances between them,—the minor streets being sufficiently wide,—were to be desired. Many might exclaim that the attempt would improve picturesqueness out of the streets, and produce monotony, but it was not inevitable; the main avenues should be lined with buildings worthy of architects, the adjacent streets be healthily and brightly finished, and intermediate and diversified recreation-grounds be provided. In certain cities regulations existed to prevent the building of dwellings outside certain limits until the intervening spaces were filled up in accordance with an agreed-upon scheme. Such stringent regulations might at first frighten those who looked upon so-called natural developments alone as being beautiful, but that was an open question. A square or rectangular development, as of American cities, the author thought, was unnatural, the tendency in all cities being for the traffic to pass and regress upon lines radiating from the centre where the principal business was conducted. The impression given by such radial development was far from unpleasant. It had been suggested that districts should be allotted for labouring classes. Mr. Street considered the separation of the classes neither healthy nor natural. In laying out a district it was better for the health of the dwellers in the main avenues than in the

minor streets adjacent the buildings should be less in height than those in such avenues, the air at the back of the higher buildings being open to the circulation of currents at a lower level, and not so stagnant and unhealthy as when the space was enclosed on all sides by lofty buildings. In laying out open spaces the dank, circumscribed, and "prisony" look general to London squares should be avoided; and the provision of large parks, stiff, flat, and uninteresting (to repeat, said Mr. Street, the words used by the author of one paper read at the Congress of Hygiene) was not at all what he intended; with intelligence a wild space could be transformed to the purposes of a park with great success. At the Congress it had been proposed that before further building was permitted around a congested district a zone of clear space should be provided, and that additions beyond should be in the form of picturesque suburbs; the effect, however, would be to still further augment the value of land at the centre, and to create differences of value of contiguous plots of land to such an extent that it might be advisable to expropriate property in such land and invest it in the State, which should lease and use it for the benefit of the nation. Railways were not to be forgotten, and the author thought that for the different main lines to come to, and round, the city, but not through the city, was better than to have a central railway station. The author had been informed that the consideration of possible developments of cities was wholly visionary; that was hardly a correct view, for they had seen the change made by Baron Haussmann, in Paris, and a great change was now taking place in the chief cities of Italy, where buildings of great archaeological interest were being swept away in order to construct high rectangular thoroughfares. The Continental representatives at the Congress of Hygiene approached the subject with much lighter hearts. Herr Lechner, of Buda Pesth, thought the best plan was to pull down the old town and build an entirely new one in its place; while Herr Stubben, the City Architect of Cologne, had urged the establishment of a comprehensive building plan, and had stated that in any future extension of Cologne 5 per cent. of the land would be reserved for parks, another 5 per cent. for plantations in streets and open places, and of the remaining 90 per cent. 60 per cent. would be given to buildings and 30 per cent. to streets. Mr. Street had prepared a sketch showing a type of what might be considered the natural development of a city, the earliest condition being a settlement of a mercantile community upon the bank of a navigable river. As the settlement tended first to spread along the bank, the early form would be that of a portion of an oval with the two centres parallel to the bank, and from that nucleus the town would increase in curves parallel to the original oval, but with roads at convenient intervals leading towards the centre, while provision for open spaces or lungs could be made. Having quoted 45 Vic., cap. 14, sec. 14, with reference to air-space round buildings, Mr. Street said it would strike any one that the provision of practically a strip of open space, 10 ft. wide, at the rear of a building, while it might be sufficient for some buildings, would be manifestly inadequate if the building was of very great height, and, in his opinion, any regulation in regard to open space should have reference to the height of the buildings. The revised regulations, he thought, might be that no building whatever should hereafter be erected of a greater height than the width of the street, and that every building in the rear thereof should have a strip of land belonging to it of a minimum width equal to one-fourth the height of the building; the height of the one-story building to be allowed in the open space should also be limited, 12 ft. to the eaves being the extreme limit. By the London County Council (General Powers) Act, 1890, no building was to be of greater height than 90 ft., and in the Draft Suggestions for a new Building Act, generally assented to by the Institute, that maximum height was reduced to 75 ft., and might, he thought, be further reduced with advantage. Under those suggestions, when streets 50 ft. wide ran in parallel lines, and the buildings were 40 ft. deep, there would be two 40 ft. front buildings, and two cross-streets being 105 ft., or 150 ft. from centre to centre. One great blot on that arrangement, however, would be that houses in the main thoroughfare would hinder the access of air to

the space at the back of the houses on the cross streets, and therefore there should be a minimum width of 25 ft. between the backs of houses in the main road and the sides of those in cross streets. The Model By-laws recommended a minimum width of 25 ft. for all houses of a height of 35 ft., or more, and if that were generally adopted air-space around buildings would be liberally provided for. With reference to street improvements, the width of 40 ft. seemed to be fixed for subordinate developments, and in some thoroughfares recently constructed the width of 70 ft. had been adopted. Subways should be constructed under all main streets, and the several gas, water, telegraph and telephone companies paying rent for the space occupied by them would practically repay the cost of construction. Wood pavement he considered hardly an unmitigated blessing, while if asphalt were not so resonant it would be difficult to conceive of a better paving. Having alluded to the desirability of getting rid of sky-signs, and of a law to limit the size of the lettering of names upon or above shop-fronts, Mr. Street turned to the question of dwellings for the labouring classes, and emphasised his previous remarks on the want of wisdom in separating the classes, and deprecated the erection of large block dwellings. It had been proved at the late Congress that London, far from being overcrowded, did not accommodate one-eighth of the number of people that was possible on a similar area, as 400 persons could be housed in block buildings on one acre; at present the proportion was 5:4 per acre, and the author thought if the erection of lofty blocks was at all likely to bring about such theoretical limits, that of itself ought to be a sufficient reason for discontinuing their erection. It was difficult to make subordinate streets slightly and interesting, as the architect was generally the last person the enterprising builder consulted, and any change for the better must come from the superior landlord directing the provision of dwelling accommodation, instead of cutting up his land for ground-rents with regard for nothing else. Small tenements might be expensive as compared with blocks, but there might be advantages to counterbalance that of cheapness, and for which the market rate might be higher. A great difficulty was to provide not only light and air, but sunshine, and the provision for it should be one of the considerations when laying out small tenements, while to make them pretty or beautiful required more real genius than in dealing with buildings where the expenditure was less restricted.

The President, in inviting discussion, said the subject which had been dealt with by Mr. Street's paper was one which affected them all more or less. They would all be agreed as to what he had said as to the great evil of breaking up streets, directly they had been paved, to lay a gas-pipe or an electric wire. London and other large towns suffered a great deal from the hideous phalanx of advertisements, and the subject, he was glad to say, had been taken up very ably by Mr. Waterhouse in a letter to the *Times*, referring to the latest stage of the nuisance, viz., that which had taken to the disfigurement of nature. It was had enough to disfigure towns, but to disfigure the face of nature was a great deal worse.

Mr. Woodward, in proposing a vote of thanks to Mr. Street, said that with regard to the question of increased open areas round to repeal that clause of the Building Act which enforced that such open spaces were not to be before, in whole or in part, by buildings. The part of London had been occupied in whole or in part by buildings, the clause was largely inoperative. With regard to open spaces with gratitude the work that had been done by Lord Drabazon, now Earl of Meath, and his Society in connexion with open spaces for London. With regard to the provision of open spaces in the laying out of new districts, our forefathers had excellent ideas, as might be seen more particularly in the West Central district of London. With regard to Sir Christopher Wren's plan for the rebuilding of London after the Great Fire, he had always thought it was greatly to be regretted that his proposal for providing an open space

along the bank of the river had not been carried out. It was also very much to be regretted that, through the neglect of the local authorities, the intentions of those who laid out Marylebone-road had been frustrated of late years by the erection of buildings which considerably encroached upon what would have otherwise remained a splendid line of thoroughfare. Mr. Woodward next referred to the street projects of the London County Council, which, he said, had been hindered and would be further delayed by the impossible proposals for "betterment" which were attached to them. He also alluded to the great desirability of opening out the Mall, in St. James's Park, the Strand, an improvement which had been promised by two successive Governments, but which had not yet been accomplished. He next contrasted the areas of open spaces in Paris, Vienna, and London, by saying that in Paris there was a provision of one acre of open space to every thirteen inhabitants; in Vienna, one acre of open space to every 100 inhabitants; and in London one acre of open space for every thousand. In conclusion, he said he was sorry to find that there was any disposition whatever to decrease the height of buildings. The height of a building depended upon the width of the thoroughfare, and in his opinion 90 ft. was not too high for a building in a wide thoroughfare. The height of the Foreign Office in Whitehall was about 90 ft. to the balustrade, and he thought that those who knew the building and the thoroughfare would not say that the building was too high for so wide a thoroughfare.

Mr. Lewis Angell said that Mr. Street's paper might be likened to a dream of fair cities; but the author did not seem to have very great faith in his schemes, for he quoted George Eliot's remark that one could not make an almanac for the millennium. Reference had been made to what had been done in Paris; where, under the Empire, the Works Committee practically consisted of the Emperor, the Prefect, and the Architect. Napoleon discovered Haussmann at Bordeaux, and Haussmann brought with him to Paris the late M. Alphand, and their labours succeeded in making Paris the pride of France, the delight of the English, and the heaven of the Americans. A modern and artistic London like the new Paris, the new Berlin, or the new Vienna, was impossible under the British Constitution. Continental methods did not fit in with English notions. To paraphrase the famous remark of the late Dr. Magee, when Bishop of Peterborough, England would rather be free than beautiful. After thirty years' experience as a municipal architect and surveyor, he (the speaker) was satisfied that nothing short of a fire on American proportions, or a Japanese earthquake, would bring about any great new departure in town improvements; such as had been foreshadowed in Mr. Street's paper. It was very much the fashion just now, in these progressive days, to denounce the great landlords; but an examination of the London estates of the Duke of Westminster, the Duke of Portland, the Duke of Bedford, and Lord Cadogan, would show that it was one of those great landlords that London owed much of the beauty she possessed. With regard to the principle of the radial development of towns, it would be seen, by examining the map of London, that London had really been developed on radial principles.

Mr. Arthur Baker said that with regard to regulating the heights of buildings in relation to the widths of streets, it seemed to him to be a great pity that a hard-and-fast rule should be laid down in the Building Act. He thought it would be much better if it could be arranged that a man should be allowed to increase the height of his building in proportion to the distance at which it was set back from the normal frontage line. He exhibited a diagram in explanation of his views on this point.

Mr. H. Dawson said he thought that there must be some mistake about Mr. Woodward's figures as to the proportion of open spaces to inhabitants in Paris. He should be inclined to think that the acres of Fontainebleau had been included in the calculation referred to.

Mr. McLachlan having spoken, the Local Government Board, also questioned Mr. Woodward's figures, and he quoted some figures collected by a Mr. Gonld, which appeared in the publications of the American Statistical Association. Mr. Gonld stated that in London there was one acre of recreative ground,—parks

and such like,—for every 694 people; in Paris he gave it as 495 people for every acre; in Berlin 804; in Edinburgh 246; in Vienna 2,230 people to every acre of open space. In New York it was 999, and in Washington it was 361 people to every acre. He could not help thinking that those figures were more approximately correct than those of Mr. Woodward. Something had been said about blocks of artisans' dwellings, and he thought that there was, generally speaking, an undue crowding of people in such tenements. He had looked over the evidence that was given before the Royal Commission on the Housing of the Working Classes some few years ago, and he was astonished to find one very eminent philanthropic gentleman, who was largely connected with these artisans' buildings, giving it as his opinion that it was not at all out of the way to concentrate as many as a thousand people to the acre in that class of dwelling. For his own part he (the speaker) felt confident that it was a mistake, and we should by-and-by regret erecting these gigantic buildings in such huge unbroken blocks. He hoped that whatever was done in connexion with that class of building would be towards breaking them up into small groups so as to admit sunshine, and allow the air to circulate freely about them.

Mr. Edward Bond gave it as his opinion, after paying some attention to the question of providing dwellings for the working classes, that block dwellings could not be dispensed with, for a certain number of working people must always live in town, and he contended that it was quite possible to healthily house people in such dwellings. He referred to the great evils of the continuous spreading-out of the areas of London suburbs with cottages, a process which rendered it more and more difficult every year for a dweller in the centre to get a glimpse of the country.

Mr. Thomas Blashill, Superintendent Architect to the London County Council, said that if one could buy a tract of country and lay out a town upon it, one could not ensure that it would "catch on." Populations were very capricious; they would settle themselves where they liked. The practical point really was, to see that where large numbers of people congregated together each house should be built in a satisfactorily healthy manner. Of course there were questions with regard to streets. Streets were made partly as thoroughfares and partly as frontages to houses. We had a good many regulations with regard to these which were not perhaps so useful or so stringent as they might be; but the public were exceedingly impatient with restrictions. Some of the speakers had been very liberal in their notions of what ought to be given up by private owners to the public; but when they appeared in Court or in other places where he was himself sometimes visible, and when the question was as to what their clients should be allowed to do upon a particular plot, they were entirely different in their tone. There must be some humour in life to make it tolerable to men like himself, and he must say he enjoyed that kind of thing immensely. But was it not common sense to let people exercise their own free will, using restrictions only so far as might be necessary for the good of the individual and of the public? He was disposed to think that those regulations which we had for open spaces and general arrangements with regard to new buildings must sooner or later be applied to old buildings; for, if they were necessary for the new, they must often be even more necessary for the old sites.

The vote of thanks having been carried by acclamation, Mr. Street briefly replied, and the meeting terminated.

TESTIMONIAL, WEST HARTLEPOOL.—On the 2nd inst., Mr. D. Robinson, Chief Foreman of Works, was presented by the officials, workmen, and others, with a 19 in. level tripod, and staff, a writing-desk, set of carvers, and a tea service for Mrs. Robinson, upon his leaving West Hartlepool to take up the duties of District Surveyor to the County Council of Derbyshire. The presentation was made by the Borough Engineer, Mr. J. W. Brown, A.M. Inst. C.E., who congratulated Mr. Robinson on his success in obtaining his new appointment. He stated that the West Hartlepool Council were so satisfied with the conduct and abilities of Mr. Robinson that they had offered to increase his salary by 50 per cent, if he would remain with them. Mr. Robinson, however, while appreciating very highly the compliment paid him, declined the offer.

THE ARCHITECTURAL ASSOCIATION.

AN ordinary meeting of this Association was held in the meeting-room of the Royal Institute of British Architects, 9, Conduit-street, on Friday, the 2nd inst., Mr. H. O. Cresswell, President, in the chair.

The following gentlemen were elected members:—Messrs. W. E. Sedgwick, W. R. Davidson, H. C. Trimmell, C. Perks, and A. J. R. Ley.

Mr. John Brett, A.R.A., read a paper entitled "Daylight in the Dwelling House," which we print *in extenso* on another page.

The President, in inviting discussion, said that no words of his were necessary to emphasize Mr. Brett's concluding words. The subject which he had brought before the meeting was one which was deserving of their earnest study and consideration.

Mr. Paul Waterhouse said he had much pleasure in proposing a hearty vote of thanks to Mr. Brett for his interesting paper. It was not every day that they got a specialist to give them so many hints on subjects of so much importance to them. There were many points in Mr. Brett's paper which, as he would be fully aware, might be considered open to question. Indeed, it would be a poor compliment to him, after he had thrown a controversial bomb amongst them, to meet it with a mere "Thank you." He had suggested to them a course of action on certain points which might lead them astray. The theory, for instance, that any lot of windows could be made into an elevation was, he thought, one which might be misunderstood. They knew that elevations owed something of their barbotinious composition to windows, and he thought that perhaps at the present day they were too ready to allow themselves the liberties of the picturesque. There was one point to which Mr. Brett alluded which seemed to him to be very important, viz., the extraordinary difficulty of hanging works of art, with any effect, upon a wall opposite to a window. No doubt they knew the splendid collection of pictures by Mantegna which were exhibited at Hampton Court. There was a whole gallery of them, and it was impossible to see them, for they hung opposite a series of large windows. It was quite impossible to see them properly, although there was plenty of light. He believed that thousands of pounds had been spent in providing means for taking these pictures out of the room in case of fire. Mr. Brett had advocated that there should be only one window to any room, and for his purpose, viz., for the proper exhibition of works of art, he was no doubt quite right; but if they had a room of the shape which Mr. Brett particularly recommended,—a room with a window in the centre of one of its shortest sides,—such a room would not be a convenient one to work in, nor would it be always suitable for living in. It would be a great convenience in many rooms to have a second window. In regard to drawing-rooms especially (which were often placed at the corner of a building, with two external walls), while it was desirable to have a south aspect for a bright light, why should the occupants of the room be deprived of their sunsets by the absence of a window on the west side of the room? If Mr. Brett would excuse him for saying so, he thought he was a pessimist about looking out of windows. There were plenty of views, even in London, which were worth looking at from a window. As to ceilings, there were many ceilings of the Adam period, for instance, which it was a relief to look at occasionally. As to what Mr. Brett has said as to adhering to symmetry, he quite agreed that there were a great many houses in which they laid too much stress on symmetry; but at the same time it was so much a part of the traditions of architecture that certain buildings, especially town buildings of a monumental character, should adhere to certain rules, of which symmetry was one, that they could hardly give it up. In country houses, of course, they might very well lay aside symmetry, so far, at least, as the exteriors were concerned; but at the same time there were a great many houses in London and other large towns in which it would be impossible to throw over symmetry.

Mr. E. Woodthorpe said he had much pleasure in seconding the vote of thanks. In a town like London it was, no doubt, a very charming thing to have the walls of houses covered with pictures, but for his part he preferred sunlight to anything. When one came down to break-

fast and saw the sunlight coming in at the windows it seemed to give one life for the whole day. He knew a very eminent architect who said to him years ago that he should prefer a sunny office to a north-lighted one: it seemed to cheer one up so much. With regard to what Mr. Brett had said as to a single-light room giving one a much clearer definition of the face, he was very doubtful whether the result was as good as when there was a diffused light. He had seen a great many portraits by painters of very beautiful women, but he had very rarely seen one as beautiful as a woman herself, and he thought that was because the lights and shadows thrown upon the face in the artist's studio were so strong. He thought it was much pleasanter to be in a room where there were two windows, because the light was not so strong. He thought that what Mr. Brett had said about the white table-cloth rather upset his own theory, for the white table-cloth was useful from its power of diffusing light, and in lighting the face underneath the eyes, which was, he thought, the perfection of lighting; in fact, the table-cloth served the same purpose as the foot-lights on the stage. Nothing was more cheerful than a breakfast-room with two windows with different aspects, especially in the country. He liked pictures very much indeed, but he preferred the landscape itself to any picture. As to the colouring of ceilings, he had seen just lately some churches in Genoa where the architecture had been utterly spoiled by the mass of colour. In the Church of the Annunziata, which was a magnificent building, one could hardly see any outline of the architecture because the reflections from the gold and colour and the marbles were so strong. His only feeling on the subject of windows was that he preferred sunlight in the house to anything else.

Mr. Sydney Vacher, in supporting the vote of thanks, said that there was one thing which Mr. Brett seemed to have overlooked, viz., that a dwelling-house was a place for people to live in. It was necessary that rooms should be not only made beautiful by the things which they contained, but that they should be healthy and cheerful rooms to live in. A perfectly square or oblong room was not the ideal of a cheerful room. The ideal cheerful room was the room in which the walls were broken up by bay windows and other recesses. He had often noticed that in an oblong room, where there was often only a small window at one end, the walls at the further end were to some extent in darkness. With regard to the use of coloured glass in windows, his (the speaker's) advice was that if they must put coloured glass in the windows of their dwelling-houses let them, for goodness sake, abstain from putting it in the windows of the living rooms.

Mr. Matthew Webb said that while, as a painter, he would, of course, desire to see pictures in dwelling-houses as well lighted as possible, he thought that at the present time there was rather a tendency to go to extremes on the question. In many houses now it was customary to erect what was practically a small picture gallery, top-lighted, where the pictures were hung by themselves. He much preferred to see pictures hung on the walls of rooms; at the same time he was quite aware that the utility and comfort of a room ought not to be sacrificed to the pictures. By all means let the rooms be made as suitable as possible for the exhibition of pictures, consistently with their other uses. In times past, when easel pictures were no less precious than now, they were doubtless hung on walls where they could be seen; but so far as he had observed no special means had been taken for their exhibition in the planning of the rooms themselves.

The President, in putting the motion for a vote of thanks to Mr. Brett, said they were all very much indebted to that gentleman for coming down and giving his views to them on so important a subject. Although he had criticised architects rather freely, he thought he had let them off pretty well. Of course the painter was apt to look upon a house to a great extent as a shrine for his pictures, and he only fell foul with the arrangement of a house when he found that the rooms were not suitable in all respects for the exhibition of pictures. But Mr. Brett had looked upon a house too much from one point of view. Now, so long as Mr. Brett was building for himself and was his own client, he could, of course, plan his house to meet his own views; but when an architect was building for a client he was bound to consider the essential requirements of his client. People

in the country, for instance, would not thank any architect who, in order to satisfy Mr. Brett's ideas, should fall to provide them with windows giving them the best possible views of the country. It would be of no use for an architect to tell his client, in such a case, that he must only have one window to any room, and that that window must be placed high up, for people would insist upon being able to look out of their own windows, and they even wanted to do so while sitting down. Mr. Brett had alluded to the unfortunate mistake which had been committed in regard to the tapestry of Exeter College Chapel, Oxford, but the architects were not responsible for that. He had, personally, been very much interested in what Mr. Brett had said as to the setting of the subject of the Royal Academy Gold Medal for Architecture (a large town house suitable for the exhibition of pictures). He was one of the unlucky men who went in for it, but Mr. Brett's strictures did not affect him, because his drawings were never hung, it having been considered that he had infringed the conditions laid down.

The vote of thanks having been carried by acclamation, Mr. Brett briefly replied, and the meeting terminated.

DAYLIGHT IN THE DWELLING-HOUSE.*

It has been said by some modern philosopher (a German, I think) that it is not necessary to be an architect in order to live in a house, intending thus to set forth that a given theory may be a good and useful framework for your ideas although you did not yourself invent or develop it.

The Committee of your Association seem to countenance a variation of this aphorism by inviting a painter to read a paper to you this evening. They do not thereby imply that a painter can be an authority on architecture, but that he may, perhaps, know one or two things about the lighting of a house that are not usually learnt in architects' offices, but which yet may have some practical importance.

You architects lay yourselves out to be serviceable to all sorts and conditions of men,—you build for “the hutch, the baker, and the candlestick-maker,” and you have it in your power to make their lives pleasant and their home a “desired haven,” or, on the other hand, to fill that refuge with “wailing and gnashing of teeth.” No other profession in the world has such control over the destinies of men in general, but specially of painters, so I feel sure you will good-naturedly consider their wants before you put in your windows.

We shall all readily admit that the first requisite for a dwelling-house in this climate is that it should keep out the weather; and I think it can easily be shown that the next essential quality is that it should let in the daylight (when there is any). Like most things, the letting in of the daylight may be well done or badly done, and there are more ways of doing it badly than well, so that if left to chance it is likely to prove a failure.

I propose to explain in the first place what good lighting means, and how the windows should be placed so as to enable you to see things well inside the house. My next endeavour will be to show how the daylight having been admitted can be economised and utilised by reflection, and that the artistic treatment of the interior largely depends upon reflected light and on the quality of the reflecting surfaces.

You can have a very comfortable life in a tent. A tent, indeed, has charms for enterprising men second only to those of a ship,—the ideal home of the Englishman, whose estate covers the whole surface of the sea. A tent can be quite comfortable and safe even in howling gales of wind or drifts of snow, and a considerable portion of mankind for generations have found tents quite good enough for common purposes—to eat, to sleep, and to die in. But civilised man has a want which a tent cannot supply,—viz., a place for the exhibition of his treasures, especially the treasure of beauty, for which stability, permanence, and good daylight are wanted. He also requires a base of operations for his enterprises, a museum for his archives and trophies, and, above all, for the convenient arrangement of his intellectual resources,—for his books and his pictures.

* A Paper by Mr. John Brett, A.R.A., read before the Architectural Association on the 2nd inst., as elsewhere mentioned.

He may also require means for the entertainment of his neighbours and his children, and for seeing them to the best advantage.

If you can admit that a painter knows anything you may be sure he knows how to light a picture so that its merits may be well seen, and I think it will not be difficult to convince you that the lighting of pictures is an excellent criterion of the lighting of the house,—indeed, a very crucial test of it; but it is evident from our daily experience that many architects have never heard of such a principle, and will exclaim with certain disciples of old, “This is an hard saying. Who can hear it?”

Now, it is not practicable to build for a single individual; you must build also for his guests and for the public. Your client may be the most ignorant vestryman in the three kingdoms, but he will not owe you any thanks if you work down to his own personal level. Even if he devotes his whole life, say, to the choosing of hacon or cheese, he will still like to leave behind him when he dies such a house as shall have the approval of the more cultivated men of his day. Therefore you must provide for the housing of works of art, although they are not mentioned in the specification. When you have done your best the house is sure to have defects. Some of these will probably carry with them compensating advantages, and some can easily be lived down by a philosophical tenant; but defective lighting you will find very difficult to deal with, and in most cases incurable.

Daylight is more or less necessary for our physical health, for cleanliness, for the preservation of our possessions from damp, from mildew, and other enemies, but it is indispensable for the seeing of beauty. A large quantity of daylight is not the chief consideration. A glass house or a lantern is eminently unfit for a human dwelling, since smugness is a most desirable quality, and for your hangings artificial light is better than natural daylight, as I will explain later on.

The most common form of beauty harboured in houses consists of pictures. I use the word pictures in a broad sense, comprising all such beautiful things as can be shown on the walls. I do not refer to the great art of sculpture, because that is considered by many of us as an essential part of architecture. It is well known that in the great period of Greek history the pictorial art flourished, and in the fourth century B.C. what we call easel pictures formed a considerable item in the wealth of Athens. These pictures were mostly carried off by the Romans, many of them changing hands at incredibly long prices. The competition amongst collectors was as brisk then as at any time in the Victorian era. This taste, therefore, is no mere modern fashion, and in our own day it may be said to be universal, so that it would hardly be possible to find a poor cottage, even in remote parts of Wales, where there are no pictures, whilst in London they have come to be a favourite form of wedding present among the wealthy.

The daylight under which pictures can be well seen may be either direct or reflected. If direct, it should not fall normal to the surface. It may come from the right or the left or from the top, but it must not come from behind the spectator, for two simple reasons. The first reason is that his own shadow will fall on the field of view, and the second that the surface of the picture will shine. So that the wall opposite the window is not a picture wall.

The aspect of the window is not of much consequence, for although direct sunshine kills delicate colour, and is not adapted to show anything well, it can generally be diffused sufficiently for most purposes by a blind of fine texture, and the architect is not much concerned, because the exigencies of the site and the plan will already have determined the aspect for him. The subject of skylights may be put aside for the moment, and windows wall. The placing of them should be decided simply on utilitarian grounds, that is to say, how the most wall space can be well lighted.

External appearance need have no weight in the argument, for a man who cannot make any possible windows compose well in the elevation is not an artist at all, and, therefore, not an architect. I may even go so far as to say that the more irregularly, asymmetrically, and arbitrarily they are placed, the more scope there will be for developing a picturesque building.

From an outside point of view, that is as far

as the public are concerned, picturesqueness is the happiest attribute to be hoped for in a domestic building, since it will seldom be large enough to have any claim to sublimity or impressiveness. But there is this to be said on the other hand, that there is no worse form of affectation than the effort after picturesqueness for its own sake.

In streets or terraces there is not much room for choice in the placing of the windows, so we generally find such houses comparatively well lighted. It is where the phantasy comes in, as in the country-house or the villa, where your architect is rampant, that you may expect to see some artistic flourishes, constructive mistakes, and incurable lighting.

I believe that if you design your house strictly from the inside, and on merely utilitarian principles, a good external effect is inevitable, or can only be missed through a singular degree of ignorance or meanness. Of course, if you are ignorant of construction or if you want to produce a more gorgeous appearance than you can honestly afford, there is no redemption for you; you are bound to fall and to wish that you had never been born, for a mean building is usually destined to encumber the earth, and to disgrace your name for at least ninety-nine years.

Let us at once assume that your client or his heirs will have some beautiful things to grace the inside of their dwelling, and we should not overlook the circumstance that his daughters may be comprised in this category, so we must be careful to light properly this living sculpture, no less than the flat surfaces of the wall pictures.

A happy expression on the human face is largely dependent on reflected light, which concerns surface treatment rather than construction, but the fundamental consideration and root of the whole art of lighting depends on having only one single aperture in the wall, so that the direct rays may all enter parallel, and not in conflicting directions. In artists' studios you will always find this rule carried out, and I will now attempt to explain the reason for it.

Let us suppose you have to draw a portrait. A single high-light on the head involves a shade in exact proportion to it which you, as a draughtsman, can supply without any chance of error. The cast shadow likewise will have a known well-defined and inevitable relation to the shade. This simplicity of light and dark enables you easily to grasp the form, and to appreciate its undulations without uncertainty or confusion; whereas, if you have two sources of light allowing rays to enter in two different directions, not only will you get on your model two high lights in inconvenient rivalry, but all your shades will be complicated and put out of their normal relation to their lights.

The unity and simplicity of one shadow will be marred by the intrusion of another, and the result will be that your apprehension of the real undulations of the surface and the beauty dependent on them will be hindered, and considerable spaces of the surface will have no meaning for you,—the beauty revealed by one ray of light being neutralised or blotted out by others proceeding in a different direction, so that the seeing is very considerably impaired, and the form shown at disadvantage.

This is one important argument in favour of establishing only one inlet of light in each room. But there is another argument even more important, because it affects not merely the form of an object, but also its colour and texture; in fact, it fundamentally affects your seeing power. The subjective effect of cross lights is to diminish the pupil of your eye, thus curtailing absolutely your physical power of vision. Suppose, for instance, your room has two windows, one facing south and the other west, you will necessarily enter either on the north or the east sides, since both the others are outside walls. Whichever door you enter by, you will find a widow light shining right in your face. You will encounter your visitor, say, in the middle of the room, exposed against the glare of the south window, he telling as a dark patch. This is not the chief mischief to which I am asking your attention, since the light from the west window may show his surface sufficiently well to be recognised. The main point is this: the light from the south window closes up the pupil of your eye so that it will admit only about half the quantity of light that you are capable of perceiving, and the effect upon you is equivalent to depriving you of one eye altogether,—that is

to say, your visual ability is crippled to the extent of one-half, so that whilst you flattered yourself that with two windows your room would be twice as light as if it had only one, this advantage is neutralised by your being disabled from using half the available rays, to which must be added the further disadvantage that your visitor is exhibited under the most unfavourable conditions of light and shade.

In order to use all the seeing power that nature has provided you with, it is necessary that the light should reach your eye *after* having illuminated the object you want to look at, and further, that the pupil of your eye should be encouraged to open to its full size by being shaded from the glare of direct rays. For these reasons, the consulting - physician always places himself in the shade and you in the light.

As all architectural structures have upright walls, such as are very convenient to look at, it is important that they should be well flooded with daylight, so as to show such pictures as you have; and next it is advisable to economise those walls as fields of beauty, and not carelessly cut them up by chimneys for doors or fire-places. Seeing that your house is not to be a mere shelter, or casual-ward, but an intellectual preserve, it is worth while to relegate such interruptions of wall-space as far as practicable to the corners. I know that there is nothing more painful to the soul of the modern architect than a blank wall, and that sleep for him is impossible until he has broken through and destroyed that invaluable area of repose. So mad does it make him that he has been known to build in unnecessary pilasters in order to divide it up. I will venture to remind him that the impressiveness of a building from the outside largely depends on great unbroken areas of wall, and that these may be well studied in Medieval fortresses, which are admitted to be the most picturesque structures existing in Europe: take for instance the castle of Ivrea in Piedmont.

I think it may be taken as a general principle that any architectural design that is so complete in itself as to forbid the intrusion of the subsidiary arts is not adapted for a dwelling-house. I know of a man whose house was finished by Owen Jones. He is very fond of pictures, but has to keep them piled up in stacks for fear of spoiling his walls.

I have noticed that very young architects are instinctively aware of the value of accessories, since in their perspective drawings they do not hesitate to balance a poor lop-sided composition by the introduction of a carriage-and-pair, nor to collect a vagrant assemblage of pinnacles into a group by the judicious insertion of a tree. No doubt, a good house ought to be adapted for an advancing civilisation. We read that Old King Cole's wants were very limited: "He called for his pipe, he called for his glass, and he called for his fiddlers three," but there is a young King Cole now—a being to whom a sideboard, a billiard table, and three fiddles do not comprise all the indoor requisites. He calls for his books, his pictures, and his sculptors three, and if you architects practically ignore or suppress these luxuries, as you have been doing of late years by your abuse of daylight and your ignorance of its application, you will drive your young client to let his new villa for a lodging-house, and to spend his time and cash in foreign travel.

A neighbour of mine is just now building a rather expensive house in the suburbs. His architect is evidently bent on doing something quite original, and amongst other peculiarities he has placed all the day-rooms under a deep verandah made of copper, calculated to keep out all the daylight. The poor client, I surmise, had no idea what the first consequence would be, viz, that he must straightway get rid of such works of art as he had, and abjure every sort of heauty for the rest of his natural life. The unfortunate man will have very long gas bills.

We have arrived now at one well defined and very important rule, which is that the daylight should be admitted to a room on one side only. Of course, every rule may have exceptions. On the east coast of England you will have noticed many little towers, built usually of wood, with an outlook in three directions, viz, up the coast, down the coast, and out to sea. These were wreckers' nests, where dwelt those whose livelihood depended on ships cast away upon that inhospitable coast, and robbery of the unfortunate mariners.

A short time ago I was spending a day at Greenwich Observatory, where the chief day-room had windows to the north and the west. This was one of those rare deviations from my rule that could easily be forgiven, for each window looked out on one of the most beautiful views in England. When you entered that room you never for a moment thought of what was within it, although good taste reigned. You walked straight to one of the windows and remained there. No one could find fault with the judgment of the architect. Here was an exceptional opportunity not to be passed by, even at the cost of an ill-lighted room, for the summer outlook on a paradise was worth some sacrifice. Having resolved on that sacrifice, he could easily afford to violate comfort, as he has done, by a French window, but it opens into an old English formal garden, with quaint apple and fig trees in it, such as would charm the soul of Mr. Reginald Blomfield. These are the only exceptions to the rule that occur to me.

That part of a window which is most valuable is the top half, as it admits most light per square foot. The lower part only admits light reflected from the earth, and more or less coloured; therefore roll-blinds from the top should never be allowed. Any other form of curtain is less mischievous, but a roll-blind should be fixed at the bottom. In a well-lighted house the windows are carried right up to the cornice. Window heads, whether tracered or lancet, may be admirable, but should be reserved for other buildings where people do not dwell. If you ask yourselves the question which rooms are pleasantest of all those you have known, I think only one answer can be given, and it will be this: Those rooms are pleasantest in which work is done. Few would reply, "Those from which you have the best view." The man who would say so must be one whose home is sad, solitary, and unlovely; whose memories are the only beautiful visions on which his thoughts can linger.

How often do you resort to your window with relish and turn away from it with reluctance? In your town experience I may confidently reply, "Never." If you decide the question by the suffrage of all the fairly cultivated men and women you know, I think the vote would be given in favour of the painter's studio, which has either a skylight or a window too high to look out of. I believe few, even amongst women, would vote for the drawing-room. It does not usually fall to the lot of gentle-folks to spend much time in workshops, but if you have a wide experience you will cherish the remembrance of the days you have spent with the goldsmith, the blacksmith, or the carpenter, and none of those shops were lighted by architects, none of them had any outlook. If you would rather look out of your nest than into it, then must your life be sad indeed, and you had better get away into the wilderness, or to the top of the Hindu Kush.

There is in the City of Timbuctoo a great town house which illustrates nearly all the blunders that can arise from ignorance of lighting. The Sheikh is a man of the utmost good nature and nobleness of soul, and takes pleasure in his splendid possessions just in proportion to the number of intelligent men who will share their enjoyment with him, so I surmise that some of you have been his guests. He has a collection of pictures of first-rate importance, but his ingenious architect has so contrived the interior that hardly any of them can be well seen. The value of some of the pictures is so great that a very few of them would cover the cost of the whole building, yet many of them are condemned to blush in dark corners in order that the architect should indulge his childish taste for symmetry. The principal suite of rooms face the south, and are all lighted in the orthodox way, viz, on their long sides. The opposite long walls do not afford any good lighting, because, as I pointed out, your own shadow and the shine on the pictures conspire to render them invisible; and the gigantic fire-places occupy about a third of the area even of these walls. The only well-lighted spaces that the plan allowed were the short walls that stand north and south. These he has wantonly and ruthlessly wasted by opening a vast doorway in the middle of each of them big enough for the gate of a city, and so the design was finished.

I think many architects would be surprised if they knew how fine an effect is produced by entering a room at the corner instead of at the side. It must be very unusual, since I do not

know more than two or three instances of it. Its charm depends on the varied angles under which the walls present themselves to the eye when you enter, as all of them are seen under oblique instead of parallel perspective, and the suggestion is conveyed that you should go on and prosecute your researches in the ramifications of the structure. You are not confronted by a flat opposing partition right across the line of advance.

All deviations from mere symmetry are dear to the soul of the artist, because they give occasion for composition,—that is to say, the creative faculty,—and if there were no other reason for placing a window out of the centre of the wall, this would be sufficient, but as a matter of experience many reasons for doing so are not far to seek.

There are instances in which one whole wall is filled in with glass, and with excellent effect. There is one in a house very near my own built by Mr. Waterhouse. It is the window of a fine staircase, the other whole walls of which are well lighted and well adapted for pictures; but, alas! the use of stained glass in the window has put this out of the question; and instead of an intellectual feast of fine art, you are indulged with some admirable colour and design in the glass itself, but the walls are wasted.

Let us now turn attention to the second division of our subject, and determine how to deal with the daylight when we have let it in. This important question is too often shirked by the architect, and shuffled on to a scapegoat called the decorator. This pernicious person has the power of doing immense mischief at small expense, so he does it with no niggard hand.

For a concrete example, let us refer back to the great house in Timbuctoo. The picture-show begins at the dining-room, the walls of which are covered with a rich stamped leather of dark maroon and gold, affording a fine background both for pictures and guests. The decorative mind was just able to grasp this principle, and, knowing there was "nothing like leather," he carried it right up from floor to ceiling, absorbing that part of the wall which is too high above the spectator to be serviceable as background, and destroying its power of reflecting light, which is the only function it could have fulfilled, and would have fulfilled with admirable effect if its surface had been tinted with tempera or an ordinary wall-paper of a cream colour. The ceiling, as usual, is cut up with mouldings and coloring of senseless pattern; but even if it were well designed, he would surely be an odd sort of visitor who would turn away from Vandeyck or Sir Joshua Reynolds to gaze at the ceiling. A few sixpenny buckets of whitewash expended on that ceiling would have redeemed the room, and proved that it belonged to an intelligent human being. Whitewash is a by-word with the modern aesthete, but it has its uses.

There are two different conditions under which light can be reflected.

They are known in optics as whole light and scattered light. Whole light advances in one direction only. An ordinary plane mirror reflects whole light. The light called scattered light proceeds in all directions at once, and cannot be focussed by the eye so as to show images. Such is the light reflected from any granulated or dead surface, such as tempera, snow, or sand. If you require a polished surface to reflect light into a dark corner, it will fall to do so unless it is placed at exactly the proper angle, whereas a scattering surface will be efficient at any angle. All surfaces that are not strictly required to do duty as backgrounds should have a scattering surface so as to diffuse the illumination, and the lighter their colour the more efficient they will be for this purpose.

In Italy, unfortunately, there is more or less good art displayed on the ceilings of the great houses. All men who have seen it will agree that it could not have been more foolishly misplaced or more effectually wasted.

The greediness that asks for every surface to be made beautiful is not only a childish greed that wishes all bread were cake, but an immeasurably mischievous one, for there is in every room one surface that can only render good service when kept plain, and so enabled to set off to advantage the beautiful things that are more favourably placed for examination. That surface is the ceiling. The ceiling is an invaluable reflector and economiser of light,

and that is the only thing it can do thoroughly well.

If the economy of daylight by reflection is to be overlooked, all art may be banished from the dwelling, for few things are more painful than the spectacle of beauty wasted. An excellent reflector of scattered light is a white linen cloth. It is well known that people look their best at a dinner-table, and I suppose it has been the practice in all civilised ages to serve the dinner on a "fair linen cloth." When the lamps are alight, a strong reflection is sent up from the table-cloth into the faces of the guests, filling their shady recesses with a warm illumination, and giving them a more or less angelic appearance, or, at all events, putting away the lowering and gloomy evidences of hunger and ill-temper.

Your architect will gladly provide you with good shelter where a horde of menials can eat and sleep comfortably at your expense. Violet-Lane is careful to go further, and provide that you shall look out on the prettiest view, but he calmly assumes that you are sure not to have anything inside your house so well worth looking at as the houses or shrubs opposite, and the historical conclusion of the whole matter is that in the reign of Queen Victoria, in nine great houses out of ten, any kind of art is out of place, for the simple reason that the architects have misused the daylight and wasted the wall-space.

One word more has to be spoken as to the use of stained-glass, and it is this:—If you wish to indulge in stained glass, you must make it your one and only form of colour-decoration. You can have superb colour in your window, but you take away its usefulness as a source of light, and make it an object to be looked at, and when you have looked at it your eye is unfitted to see any other colour. Even the splendid tints of Eastern embroidery or carpets cannot stand the competition; white light is absolutely necessary for the display of their beauty.

Mr. Burne-Jones lately designed a beautiful picture, and Mr. Morris worked it in tapestry for the glory of the chapel of Exeter College. Some ingenious person has placed it on the same wall with a gorgeous stained-glass window, and opposite to another, so that none of its fine colour can be seen. I need not enlarge on this subject. Once seen, that painful spectacle can never be blotted out of your memory. The colour of your reflective surface is only one degree less important than the colour of your window glass itself.

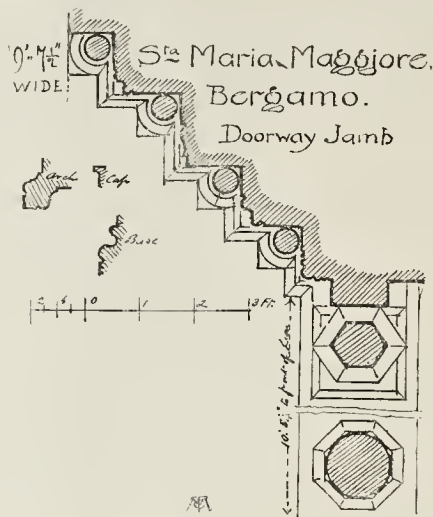
I once knew a physician who had the walls of his consulting-room painted of a strong uniform green. He was quite unaware of its professional advantages, and said he thought it restful to the eye. His decorator had told him so, having doubtless heard that green shades were used by people with weak eyes. As a matter of fact all his patients appeared to have the cholera, and it had to be repainted. A few years ago nearly every reception-room in London was papered with a dull sage green; a sad emphasis to lay on the depressing climate we have to live in, but a good man and a friend of mine was responsible for it.

I am afraid you will think I display an unreasoning animus against the architect, and that I have spoken rashly and at random as to his ignorance of the use of daylight. But that is not so. There is an institution in which I lately offered to endow a prize for the best design for a house in which pictures could be well seen without a special gallery constructed for the purpose. The Council were pleased with the idea, but, scoring my modest 25*l.* a year, made it into a handsome 200*l.* Two or three distinguished architects were appointed to judge the competition, and they actually awarded the prize to a design which afforded not one single well-lighted wall in the whole structure; and yet none of them were aware that they had done anything ridiculous.

There is a good deal to be said as to skylights in lighting the dwelling-house, but you have probably heard more than enough on the sacredness of the wall and the importance of one window. Allow me to suggest, in conclusion, that these matters are worthy of your most serious study.

[Some notes of the discussion which followed will be found on another page.]

FRET SAW.—The managers of the Britannia Works, Colchester, call attention to an improvement in their "No. 5" fret saw by the addition of a new means of tightening the saw after it is fixed, and also by the addition of a boring appliance.



THE LONDON COUNTY COUNCIL.

A SPECIAL meeting of this Council was held on Thursday, the 1st inst., the Chairman, Mr. John Hutton, presiding.

The Proposed Taxation of Ground Values.—The discussion on the question of the taxation of ground values was resumed, and after several amendments had been discussed and defeated, Mr. Stuart's motion, as printed in our last, was agreed to.

The ordinary weekly meeting of the Council was held on Tuesday last, the Chairman of the Council again presiding. The greater part of the sitting was devoted to the renewed discussion of the subject, and to some further proposals of the Local Government and Taxation Committee, but no conclusions were arrived at, and the further consideration of the proposals was adjourned to a special meeting summoned for Friday, December 9.

The New Works and Stores Committee.—One of the items on the agenda was the election of six members who, together with the twenty-four members nominated by committees, are to form the new Works and Stores Committee. Dr. Collins said he was sorry to find that out of the twenty-four members already elected, only two belonged to the party on the Council to which he had not the honour to belong. He, therefore, moved that the following members of the "Moderate" party be elected to the six vacancies in the committee:—Alderman Beachcroft, Mr. Boulnois, the Duke of Norfolk, Mr. Buxton, Mr. Westcott, and Colonel Hughes.

Alderman Beachcroft said he regretted having to decline the honour, his time already being fully occupied. Messrs. Westcott, Buxton, and Boulnois withdrew their names for the same reason, and the Duke of Norfolk withdrew his for the reason that he had "neither the knowledge nor ability to qualify him for service on the Committee." Colonel Hughes, M.P., objected to serve for two reasons,—the first was that he did not belong to the "Moderate" party, and the second was that he was already overworked.

Mr. Nathan Robinson asked whether he would be out of order in appealing to some other members of the "Moderate" party. Surely there were some of them who had some ability? It looked almost like a conspiracy to avoid serving on the Committee.

Other members of the "Moderate" party were appealed to, but all declined to serve, and in the end the following members were elected:—Messrs. Arnold with 69 votes; Stevens, 58; Sheffield, 51; Hood Barrs, 47; Freake, 43; and Taring, 38.

After transacting other business, the Council adjourned at seven o'clock.

THE SLADE PROFESSORSHIP OF FINE ART AT UNIVERSITY COLLEGE.—It is stated that Mr. Fred Brown has been appointed Slade Professor of Fine Art at University College, London, in succession to Prof. Legros, resigned.

Illustrations.

BRONZE DOORS, ADELPHI BANK, LIVERPOOL.

THE bronze doors and grille illustrated have lately been erected at the main entrance of the new premises of the Adelphi Bank, at the corner of Castle-street and Brunswick-street, Liverpool.

They were designed by the architect of the bank buildings, Mr. W. D. Caröe, and the figure sculpture is from the hand of Mr. T. Stirling Lee.

The general work in connexion with the doors and grille was executed by Messrs. Starkie Gardner & Co., of Lambeth; the metal casting of the panels and statuettes being entrusted to Mr. Buhner, of Chelsea, who employed the *cire-perdue* process, from wax models prepared and worked upon by the sculptor.

The doors are fitted with a lock specially devised by the architect, and executed by Messrs. Chubb & Son.

The figure subjects were suggested by the name of the bank and illustrate acts of devotion of well-known "Brethren" of tradition:—

1. David and Jonathan: "Jonathan's warning to David."
2. Achilles and Patroclus: "Achilles mourning for Patroclus."
3. Castor and Pollux: "Guiding the Argonauts."
4. Roland and Oliver: "Orlando (Roland) rescuing Oliver;" the last incident being drawn from Shakespeare's "As You Like It."

The drawing was exhibited at the last Royal Academy Exhibition.

CHAPEL, RIDLEY HALL, CAMBRIDGE.

THIS chapel was erected last year (along with a students' block) from the designs of Mr. William Wallace, the style being the same as the original buildings at Ridley, which were designed by the late Mr. Luck.

Stalls are provided for fifty-four students and the principal and vice-principal. All the internal fittings and roof are of wainscot oak.

Red Ipswich bricks are used for the walling, with Ancaster stone dressings.

The corona of the angle staircase turret is executed in English oak, with a copper covered cupola.

All the windows are filled with stained-glass representing the Early Teutons of the Church.

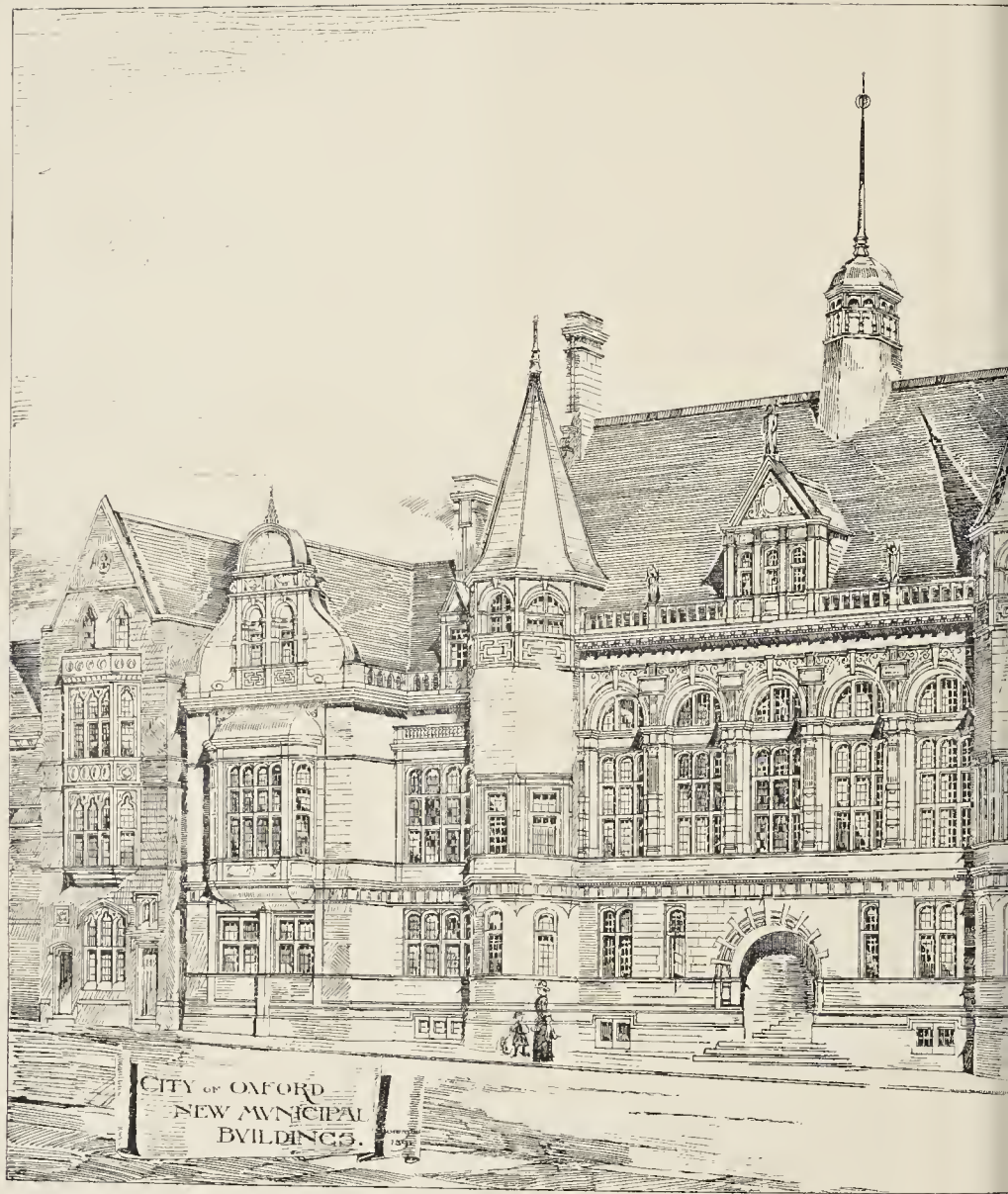
The whole of the works in connexion with the chapel and students' block were carried out by Messrs. Holloway Brothers. The stained-glass was by Mr. Newbery.

The drawing was exhibited at the last Royal Academy exhibition.

THE SOUTH PORTAL OF SANTA MARIA MAGGIORE, BERGAMO.

IN a north-easterly direction from Milan, is situated Bergamo, divided into the New Town





Royal Academy Exhibition, 1892

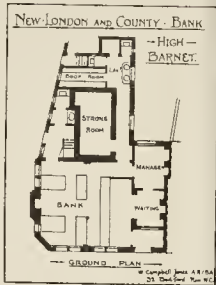
COMPETITION DESIGN FOR OXFORD MUNICIPAL BUILDINGS



PHOTO-LITHO SPRAGUE & CO 4 & 5 EAST HARDING STREET FETTER AINE E.C.

BUILDINGS—By MR. THOMAS DAVISON, A.R.I.B.A.



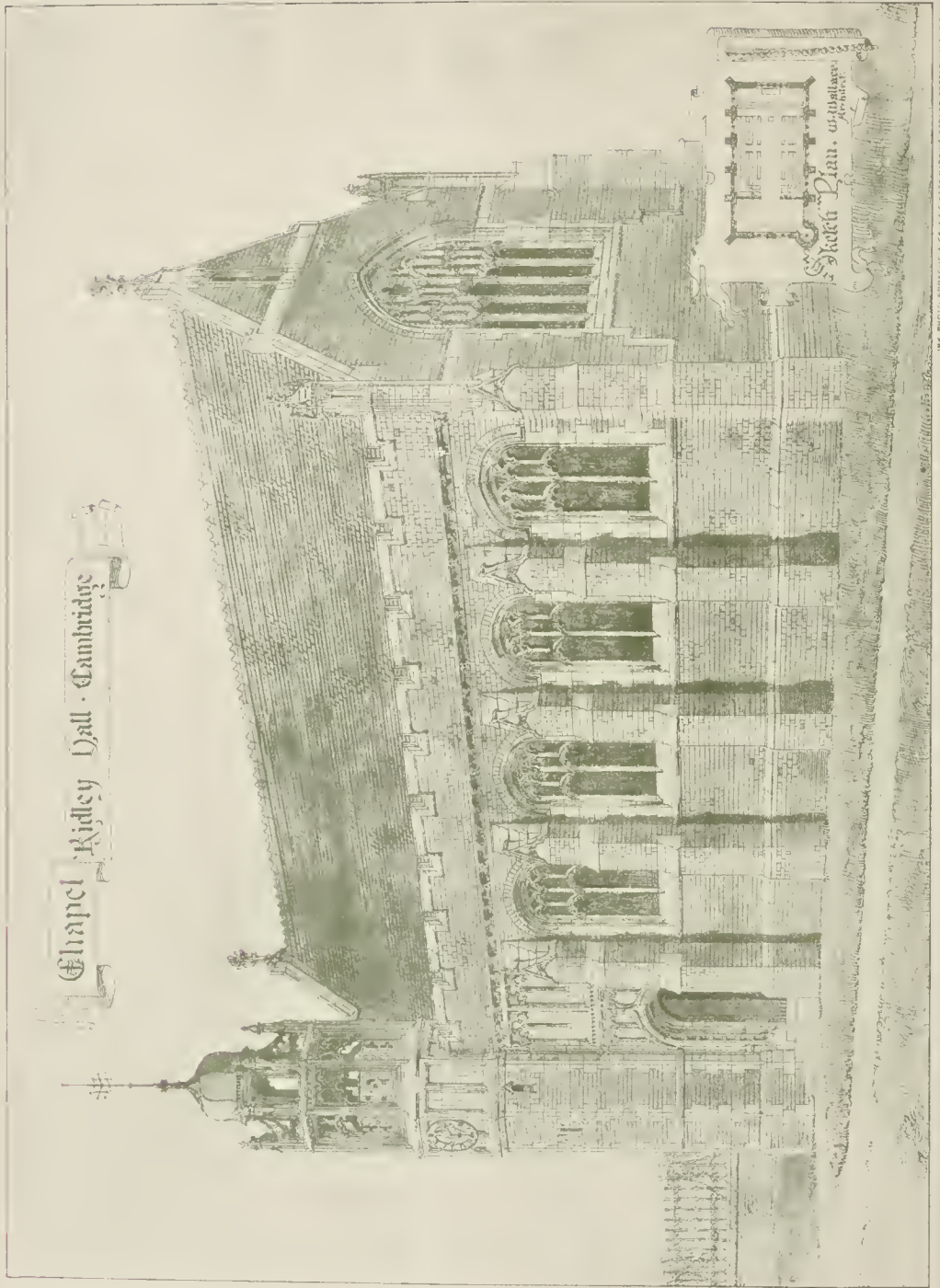


NEW LONDON AND COUNTY BANK, HIGH BARNET, E.C.

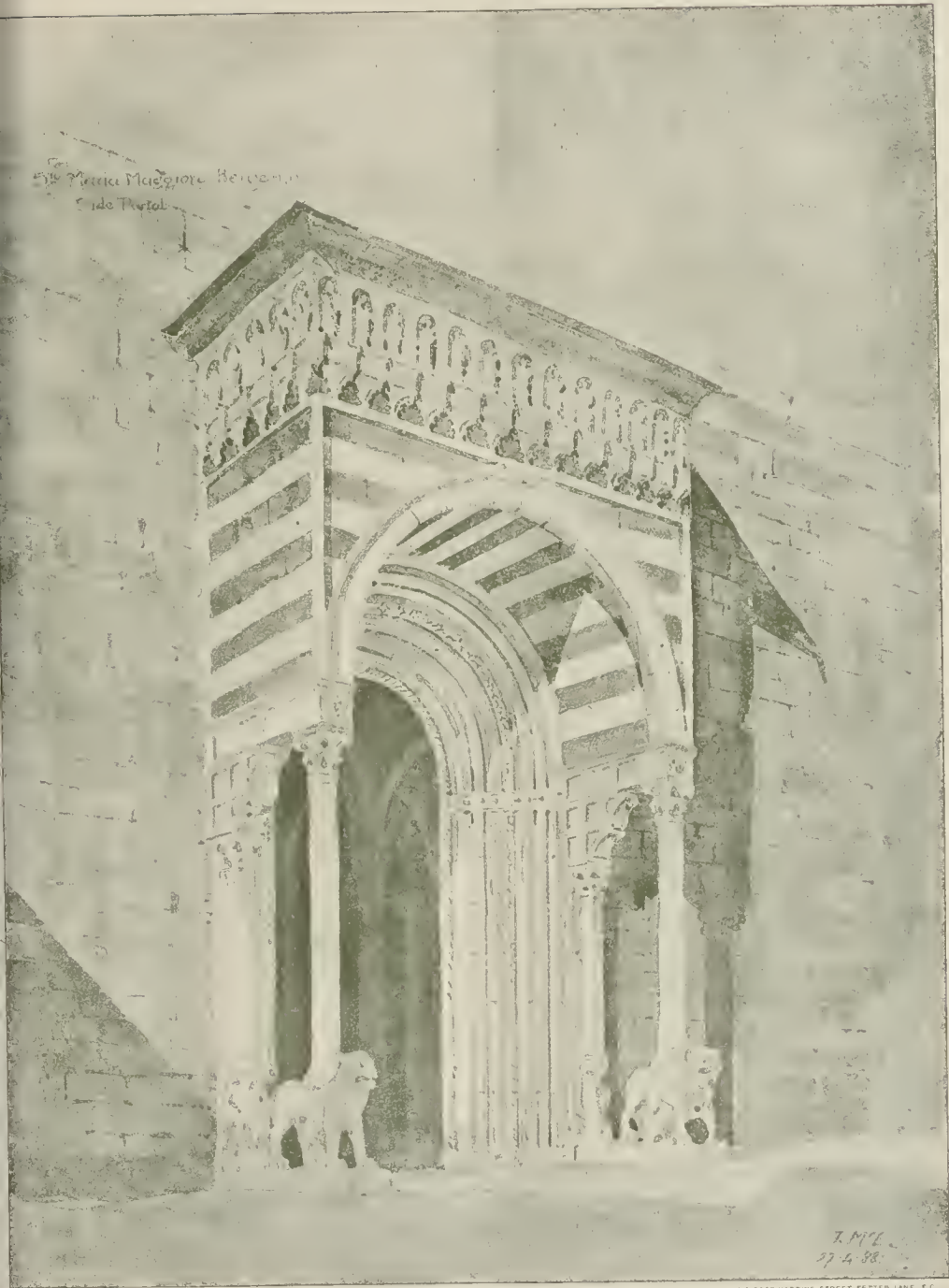


THE BUILDER, DECEMBER 10, 1892.

Chapel · Kidley · Dall · Cambridge

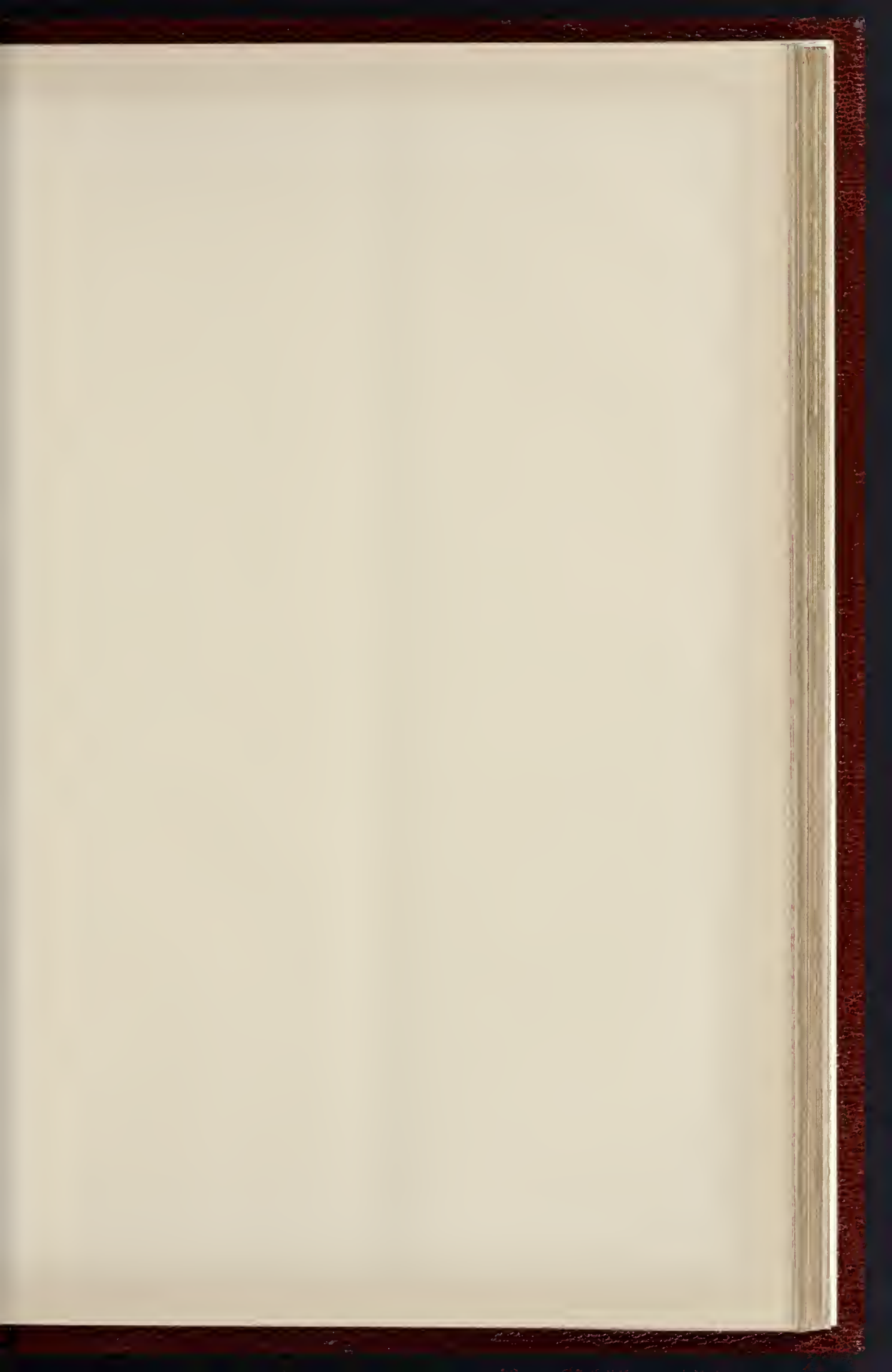


Sketch Plan. W. H. Sturges & Co. Architects.

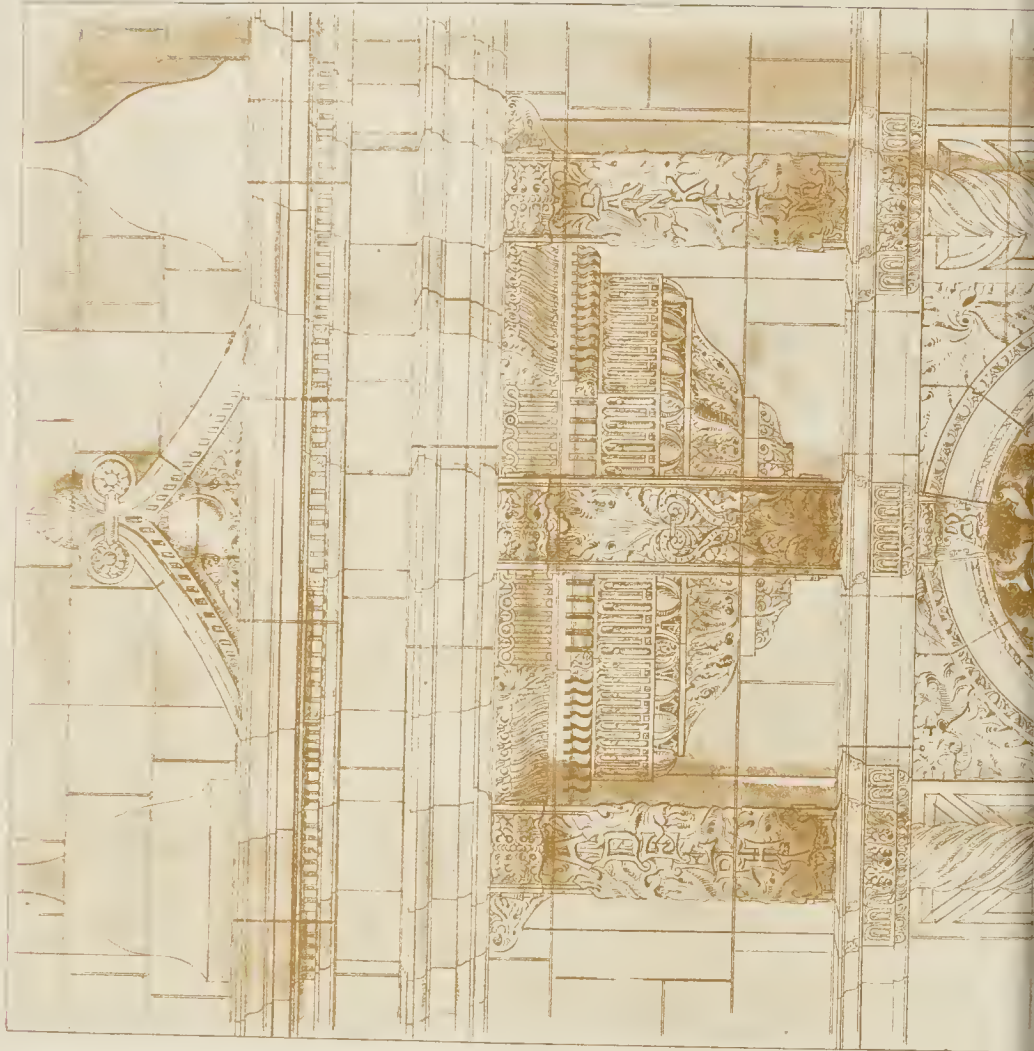


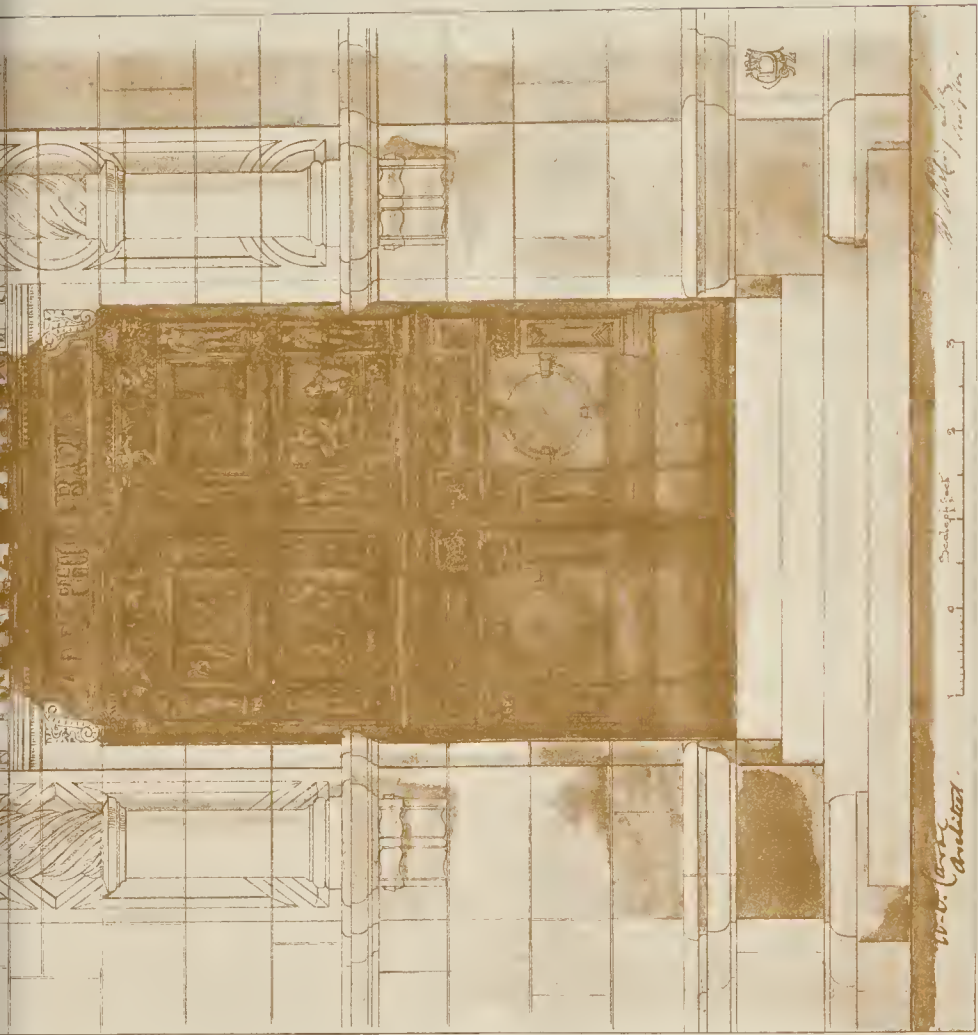
PORTAL, STA MARIA MAGGIORE, BERGAMO—DRAWN BY MR. T. MACLAREN.





THE BUILDER: DECEMBER 10, 1892





W. W. Carter Architect

BRONZE DOORS, ADELPHI BANK, LIVERPOOL. MR W. D. CARRIE, F.R.I.B.A. ARCHITECT

Royal Academy Exhibition, 1892



:FIRST FLOOR PLAN:

Competition Design for Oxford Municipal Buildings: Plan.

and the Old Town, the latter beautifully situated in the hills, and called Bergamo alto or Città.

In a prominent position behind the Broletto stands the Church of Santa Maria Maggiore, a North-Italian example of Romanesque erected in 1173.

There are two very fine portals to the north and south sides of the church. That illustrated is the portal to the south side.

The simplicity of its parts, and the well-angled scale between the frieze formed of capitals in niches and cusping under, and the lower part of the design, has produced an effect both dignified and monumental.

In the receding planes of moldings in the arch, the Gothic influence is apparent, though the moldings are flat and delicate in section, rather than deeply undercut. A plan of the arch of the doorway is added.

The use of the sculptured lions and kneeling figures behind, under pillars, performing a structural function, probably might not be sanctioned as the strict use of sculpture in conjunction with architecture, yet a certain element of charm is the result, which one could have wished had been attained by other means; but, taken as a whole, the portal displays a satisfying breadth of design.

The drawing was exhibited at the last Royal Academy Exhibition.

T. MACLAREN.

DESIGN FOR CITY OF OXFORD MUNICIPAL BUILDINGS.

The geometrical drawings of this design were submitted in the preliminary competition, the perspective being prepared later for the Royal Academy Exhibition.

The general arrangement of the principal rooms is shown on the accompanying plans, the offices and police-station being on the ground-floor.

Ford stone was proposed for the external walls, with stone-slate roofing.

T. D.

TWO COUNTRY BANKS:
LONDON AND COUNTY BANK, HIGH BARNET.

The existing premises of this Bank having been found inadequate, the directors have acquired a new site at the corner of the High-street and Park-road, and are erecting thereon entirely new premises, at a cost of some 4,500l. The banking office on the ground-floor, 30 ft. by 27 ft. 6 in., provides accommodation for some fifteen clerks, and will be fitted throughout with American walnut. An arched recess,

forming a waiting-room, gives access to the manager's private office, and at the rear of the banking office are a strong-room, book-room, clerks' lavatory, &c., and also the private entrance and staircase to the manager's residence over. The upper floors are entirely devoted to the residence, and consist of three sitting-rooms, seven bedrooms, kitchen, and offices. The elevations are faced with best Bracknell red bricks, and the stone is brown Anaster, from Messrs. Lindley's quarries, the plinth being of Kentish Rag stone. The roofs are covered with dark Broseley tiles.

LONDON AND COUNTY BANK, HENLEY-ON-THAMES.

Here the directors acquired the adjoining premises to their then existing Bank, and entirely reconstructed the front, and put new roofs, &c., the carcass of the old building being in other respects retained. The banking office is 25 ft. square, with manager's room behind, the strong-room, &c., being in the basement.



Bank, Henley-on-Thames. Plan.

In order to economise space, the Bank and the manager's residence are entered from the same lobby, an arrangement which answers well, and is now constantly adopted, especially at the country branches. In this way the long narrow passage at the side of the Bank office, leading to the manager's staircase, is avoided. The kitchen and offices are in this case on the ground-floor, and sitting-rooms, bedrooms, &c., on first and second floors. The front is faced with local red bricks, with Ham Hill stone dressings, the plinth being a combination of snapped flints, stone, and red bricks. The roofs are covered with dark Broseley tiles, and the half timbering is coated with carbolium.

The total cost of the works was 1,400.

The general contractor at High Barret is Mr. W. M. Dabbs, of Stamford Hill, and at Henley-on-Thames Mr. J. Weyman, of Market-square. Mr. G. G. Woodward has acted as clerk of works, and the architect is Mr. W. Campbell Jones.*

GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.—On the 3rd inst. fifty students attending the architectural and building construction classes of this college (Mr. Charles Gourlay, lecturer) visited Hawkhead Asylum. The party were conducted by Mr. Crawford, clerk of works, through the main portion, which is just being built, the farm-steading, which is nearly finished, and finally the quarry on the estate, whence some of the stone is being obtained.

* That the plans of both these buildings, that given in the text, and that on the lithograph, are without scales, is the architect's omission and not ours. Plans for publication should always be accompanied by clearly-figured scales. To write on the plan "2 in. scale" is of no use, as the scale is in most cases necessarily altered in the reduction of the plan for publication.—Ed.

MAGAZINES AND REVIEWS.

The *Art Journal* starts with an article on Mr. Ernest Parton, illustrated by a fine etching by Mr. C. O. Murray from his landscape "When Daylight Dies," in which there is something of the sentiment of Corot, expressed with a very different manner. Miss Hapworth Dixon continues her consideration of "Recent Fashions in French Art," dealing in this article with the religious mysticism in the guise of modern life of which M. Béraud has set the example. The article is illustrated by engravings of that painter's "Descente du Croix" and M. Lhermitte's "L'Ami des Humbles," a kind of leaf out of Béraud's book (as far as the idea is concerned), and M. Flameng's very different work, "Le Repos en Egypte." Mr. W. Shaw Sparrow writes on the revival of Art Guilds, recognising that the state of art and society is very different from what it was in the time when such guilds did most flourish, but urging nevertheless that, once revived, they would thrive. The last paragraph of his article on the unrecognised sources of artistic inspiration in the fields of labour, is both eloquent and true, and should receive attention. "Bolton Abbey in the Present Time" is illustrated by some pleasant sketches to an article by Miss Louise Berens. Mr. Aylmer Vallance continues his articles on furniture and decoration of the house, treating of "window-blinds, lighting, and accessories." The article includes some very good bits of design, some of them by the author, though, by the way, we do not see one of a window-blind.

The drawings of Daniel Vierge, in illustration of Quevedo, are treated of and illustrated both in the *Art Journal* and the *Magazine of Art*. The latter periodical has a very interesting article by Mr. Theodore Watts on "Portraits of Lord Tennyson," of which many are reproduced, and it is remarkable how very various is the impression conveyed by them. M. Viccars continues his illustrated notice of the Leicester Art Gallery. Mr. Claude Phillips writes on the French sculpture of the year, among the illustrations to which we are glad to see he includes the fine and imaginative "Doorway" by M. Bartholomé, with two figures in it with their backs to the spectator, which was the only piece of sculpture of much account in the last Champ de Mars Salon.

In the *Fortnightly Review* Mr. Walter Crane writes on "The English Revival of Decorative Art." There is nothing very new in it, but it is a picturesque and racy sketch of the progress of taste in decoration during the last generation. Mr. Crane touches on the formation of the Art-workers' Guild, reminding the reader that it was a recoil from the unsuccessful effort to induce the Royal Academy to take up decorative art as a part of its annual exhibitions. We fear it is hopeless to expect that such a step will be taken by the Academy, though it is the body which ought to represent "art" in the widest sense, and not merely painting and sculpture. Mr. Crane makes one suggestion in regard to the reason for the dearth of public works of art in this country, viz.: "the strength of the domestic sentiment in English life. There may be something in this."

Harper's is altogether a "Christmas number" i.e. a number consisting of readable and rather sensational stories, the only touch of art coming in in the shape of an article by Mr. Theodore Child on "Some Types of the Virgin," with illustrations of various heads of the Virgin from old masters. The article is original and scholarly, and worth reading. In the course of it the author well remarks that "each great Madonna represents a state of soul; the mystic and tender soul of the painters of Siena; the complex intellectuality of the soul of Botticelli; the seductive grace of the soul of Raphael, more intelligent than creative; the epicurean refinement of the soul of Leonardo. . . . the classical metempsychosis of Madonnas, who seems to have resumed that tradition of primitive Christianity which identified the Virgin with the ideal Roman matron, if not with Minerva herself."

The *Century* includes an article by Mrs. Van Rensselaer on "Picturesque New York," which like London, has more elements of the picturesque than is generally supposed. The illustrations are by Mr. Mielatz and Mr. Manly. That of Madison-square on a rainy night, with the lofty blocks of buildings dimly seen through the rain, is fine; and the sketch at Coenties Slip shows that New York too has its picturesque old dock buildings with a varied skyline. Among "Topics of the Time" are a

few words on "Government Architecture in America," strongly urging that important buildings should be given to eminent architects and that official architecture should be abolished.

Scribner's Magazine has an interesting but not very critical article on "Mural Paintings at the Panthéon" (Paris), in which the writer seems to be so carried away by admiration of the spirit of the French Government in carrying out such a work at all, that he forgets to see the serious mistake of carrying it out on no fixed artistic scheme. The same artist contributes, conjointly with Mr. Kenyon Cox, a short and most sensible paper on "The Nude in Art," showing the absolute necessity of the study and practice of nude subjects for the highest development of art; and while they assert (and we agree with them) that mere "nude studies" are for the studio alone and not for the public, they point out that unless some artists gave themselves principally to ideal nude subjects the whole power of constructing the figure in art would languish. Of course the chief reason, that the human figure is the highest means of abstract expression in art, is not overlooked. The article is illustrated or accompanied by two fine pictures, "Narcissus" by Mr. Low, and "Lilith" by Mr. Cox, showing the practical power of the two writers to handle the subject. Mr. F. D. Millet writes an article on "The Decoration of the Exposition" (Chicago), in which there is the usual preposterous trumpet-blowing about the architecture, but a good many of the illustrations of the decorative work are really fine and interesting; among them we may mention the painting of "Needlework" by M. J. Alden Weir (in the Manufactures building), "Ceramic Painting," by Mr. Kenyon Cox, "Forging" by Mr. E. E. Simmons (in which however the figure is not forging but resting), and a draped female figure from Mr. Dodge's Decoration of the Administrative building.

In *Macmillan* Mr. H. Clarence Bourne writes an article on "The Unemployed," the assistance of whom, he points out, is not so simple a matter as Mr. Keir Hardie and "General" Booth believe. "National, Municipal, or charitable schemes for permanent employment, or for the employment of large numbers of men, must lead to disaster in future as they have done in the past; while even small and carefully conducted relief works are beset with difficulties and dangers." He quotes the remarkable little poem in Tennyson's posthumous volume as to the present undeveloped stage of the human race—"Dawn, not Day," and observes that when we have reached Tennyson's prophesied stage we may be ripe for State Socialism: "but even our present institutions would work well enough then." All which is true, but will not be believed by those whom it most concerns.

In *Longman's Magazine* Dr. Richardson gives a very interesting account of a visit of sanitary exploration to Paris, undertaken at the invitation of Dr. de Pietra Santa, secretary of the "Société d'Hygiène Publique." Among other things he heard a paper from this gentleman on the Paris water-supply, in which it was urged that every town should be supplied from an independent and pure source, and no stream receiving sewage should ever be utilised for supply. Dr. Richardson gives an account of a visit to the Paris sewers and other institutions.

Blackwood has a pleasant article giving what is called "A Bird's-eye View of the Riviera," which will be interesting to those about to visit that locality for the first time.

In the *Cornhill* we find an article on the rise of towns, describing some remarkable instances of rapid growth, not the least remarkable being that of some of the suburban towns (as they may be called) of London.

In the *Antiquary* we find a description of the "discovery" of an ancient Lake Village in Somersetshire, by Mr. R. Mauro, a reprint of a contribution to the *Times* in October, which we are glad to find preserved in this more permanent and accessible form. The Rev. C. Cox contributes an illustrated notice of "Medieval Embroidery at Hardwick Hall." "Notes on Archaeology in Provincial Museums" is continued.

Among two or three "Christmas Numbers" of weekly publications which have been sent to us, we may notice a fine chromo-lithograph issued with *Julia-Tide*, of three half-length figures under the title "Rose Shamrock and Thistle," a group of charming heads, and very well printed.

ARCHITECTURAL SOCIETIES.

LIVERPOOL ARCHITECTURAL SOCIETY.—The ordinary meeting of the forty-ninth of this Society was held on the 5th inst. at the Royal Institution, Colquhoun-street, Liverpool. Several new members, students, and associates were elected, and afterwards Mr. J. Slater read a paper on "Bricks and work."

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—At the Law Institute, Alhambra-places, on the 5th inst., the opening lecture of a session was delivered to members of the Leeds and Yorkshire Architectural Society by A. Keen, of London, on "Vaulting." Mr. Keen, President, was in the chair.

ENGINEERING SOCIETIES.

THE INSTITUTION OF CIVIL ENGINEERS.—At the ordinary meeting of this Institution on Tuesday last, Mr. Harrison Hayter (President) in the Chair, it was announced that Associate Members had been transferred to the class of Members, and that 83 candidates had been admitted as Students. The ballot for the Session 1892-93 resulted in a election of 16 Members, 132 Associate-Members, and 3 Associates.

THE SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Town Hall, Westminster, on Monday evening last, Mr. Joseph William Wilson, jun., President, in the chair, a paper was read by Mr. A. G. Fry on "The Shortlands and Nunhead Railway." The paper commenced by stating that the line was promoted by several landowners for the purpose of further developing their estates, they being also joined by the L., C., & Ry. Company, who by means of the new

work have obtained an alternative route to the metropolis. The railway, which is a double line, commences by a junction with the Chatham Company's main line at Shortlands, and runs through open country for the first half its length, then runs through the suburbs of

Stifford and Brookley, and terminates by a junction with the Chatham Company's Greenwich branch at Nunhead Station, having crossed a branch of the S.E. Railway as well as the N.E. & S.C. Railway's main line, on the route of which the line is 4½ miles, and, considering the short distance from London, the amount of

house property interfered with was very small. Attention was drawn to the fact that the line, having been laid out to suit the views of the landowners, has not been laid out perhaps in the best way from an engineering point of view, so that as some of the estates passed through

are about to be developed as first-class building properties, the accommodation bridges are both frequent and of a width or span suitable to the present and future requirements. The elevated viaducts are of a more or less ornamental character, all of which requirements have added considerably to the cost of the undertaking. In alluding to the earthworks, a slip which occurred in the Shortlands cutting

was described. A portion of the cutting had been trimmed with a slope of 2 to 1, when, after a period of wet weather the material broke away and slid forward on a bed of stiff clay which dipped down towards the cutting. To repair it a deep grip was cut round the back of the slip, and pipes laid to intercept the water and carry it round to the ends of the clay bed, after which a dwarf wall of concrete was built in front to support the

bed of the slipped material and to prevent its coming any further. The works were shortly described. The number of bridges in the length being twenty-five, in addition to two short viaducts. Six of these bridges are for public-road crossings, two are over other railways, two are over streams, and fifteen are accommodation bridges. Brickwork and concrete has been used in the construction of the abutments and wing walls, the brickwork being in lias lime mortar except in the case of arches or in important situations when cement mortar was used. The road bridges over the railway are chiefly of two types. One consists of a pair of plate girders resting on brick abutments and spaced from 6 ft. to 7 ft. apart; between the girders are Jack arches, which spring from their lower flanges, the top is levelled up with concrete and asphalted, the road-metal being laid above this. This type was adopted as there was not sufficient roadway available for arched bridges. When

the roadway was very restricted another type of floor was adopted, which consisted of shallow troughs of a rectangular section, built with plates and 2-in. bars, and placed parallel with the roadway. In this case the span was divided by columns placed between the lines of rails.

At Catford, a short brick viaduct, 620 ft. long, carries the line through the building property; it includes two skew spans with girders and trough-flooring over roads. At the south end of it three arches, spanning the river Ravensbourne and a mill-head, are built on a considerable skew, the angle being 45 degs., with a square span of 32 ft. 6 in. The remaining arches are on the square, and vary in span from 21 ft. to 25 ft. Within 450 ft. of the Catford viaduct there occurs another short one, 200 ft. long, and adjoining this to the northward a retaining wall 500 ft. long has been built on one side of the embankment. This wall is of concrete with counterforts at the back, with the face of brickwork 9 in. thick tied into the concrete by vertical brick dovetails placed 6 ft. apart. The stations on the line are five in number. The works have been carried out under the direction of Mr. John Wolfe-Barry, M. Inst. C.E., the author acting as resident engineer in charge. The contractors were Messrs. Lucas & Aird, who were represented on the ground by Mr. John Blin, and latterly by Mr. Charles F. Day.

COMPETITIONS.

LOCAL BOARD OFFICES, CROMPTON, LANCASHIRE.—The committee of the Crompton (Oldham) Local Board have made the following awards in their recent architectural competition for new board offices:—1st premium, Mr. H. Cheetham, Oldham; 2nd, Messrs. Woodhouse & Willoughby, Manchester and Stockport; 3rd, Mr. John Johnson, Victoria-street, London. The competition was an open one, fifty-two sets of designs being submitted. Mr. John Wild, architect, of Oldham, acted as assessor.

LOCAL BOARD OFFICES, BEXHILL.—We understand that the designs of Mr. H. Ward, architect, of Hastings, have been placed first in this competition by the assessor appointed by the Board to adjudicate on the designs.

SEWERAGE, MYTHOLMBOYD.—In reference to this competition mentioned in our last (p. 446, ante), we are asked to say that the premiums of 60l., 25l., and 15l., respectively, were awarded as follows:—(1) Mr. F. Beesley, Westminster; (2) Mr. W. H. Thomas, Westminster; (3) Messrs. Savage & Davies, Sheffield.

SANITARY INSPECTORS' ASSOCIATION.

At the December meeting of this Association, held on Saturday evening last at Carpenters' Hall, London Wall, an address on "An Attempt to Improve the Sanitary Circumstances of London," was delivered by Mr. H. Hutton, Chairman of the London County Council, Dr. Richardson, the President of the Association, presiding. Before calling upon Mr. Hutton, the President presented to Mr. C. W. Raymond, the Hon. Treasurer, and one of the original promoters of the Association, a handsome stationery cabinet and inkstand, as a mark of their sense of obligation to him for his devotion to their interests.

It was also announced that the Association would offer a prize of ten guineas (to which Mr. Hutton had desired to contribute one-half) for the best model of a sanitary milk-can for retail purposes, in which the defects of material and construction of the cans now in general use should be as far as possible obviated. The competition would be open until March 1.

Mr. Hutton commenced his address by declaring his sense of the importance of the work in which the sanitarian was engaged,—a work which would repay a thousandfold all their efforts,—in the improvement of the physical and moral condition of the people of London. Among the many points of contact which the London County Council must maintain with the people of London, there were none of more importance,—particularly in the poorer districts,—than those which came under the cognisance of the Medical Officer and the Sanitary Inspector. With the appointment of official Medical Officers by the Corporation of London, and one or two others in other parts of the kingdom, some forty years ago, sanitary improvement might be considered to have commenced, but it was not till some years later that the improvement was strongly marked. Between the decade 1861-1871 and the last decade (ending 1891) the average death-rate showed a diminution of 4 per 1,000, and, therefore, during the last ten

years the saving had been 150,000 lives, with a corresponding diminution of loss through sickness, as compared with the ten years ending 1871. That enormous saving was the more remarkable, because of the difficulty of preventing the rise in the death-rate which might naturally be looked for on account of the enormous increase in the size and population of London. The Sanitary Act of 1866, and the Housing of the Working Classes Act of 1885, had contributed to this result by extending the scope of the sanitary officer's duties, but the greatest advances in that direction had been made by the most recent of the sanitary Acts, the Public Health (London) Act of 1891. The advantages of admission to the Isolation Hospitals of the Metropolitan Asylums Board had been extended, and under this Act it was definitely required of the Sanitary Authority, not only to secure the abatement of nuisances, but to compel all premises to be put into a proper sanitary condition. A thorough house-to-house inspection by Sanitary Officers was a necessary consequence of this provision, and this had led to the right of entry for Sanitary Inspectors. It followed, too, that London must greatly increase its staff of Sanitary Inspectors, who would, after 1895, be compelled to hold a satisfactory certificate of competency, or prove that they had held office for at least three years in a London district, or in an outside district having a population of not less than 20,000 persons. It was further provided that half the salary of the Inspector should be payable by the County Council, and, the Officer's material position being in that way more assured, men of higher qualifications would be attracted to the office, and thus in a few years London would have a greatly-increased number of skilled Inspectors.

The practical power of the Inspector had been extended by the clearer definition given to the word "nuisance," and the Inspector's duties in relation to them, and their facilities for enforcing sanitary conditions, were greatly increased by the new powers given to Sanitary Authorities of making by-laws. In the opinion of the Chairman of the London County Council, the water-supply of London was far from satisfactory, but it was receiving a large share of attention from the London County Council, and he hoped before long to find that every Londoner would be supplied by a constant and direct service, which would do away with the danger, which at present existed, of the contamination of drinking water by means of water-butts and cisterns.

The removal of refuse from a town with a population of 4,251,431 (the number sleeping in London when the last census was taken) was an expensive and difficult matter, and the difficulty was constantly augmenting. The population of London at the beginning of the century was less than a million, and in 1851 it was but little more than its present amount, namely, 2,982,000. Eventually the by-laws would secure a daily collection of dust and refuse; and moveable receptacles, to be deposited conveniently in front of the house at a certain hour, would take the place of the old hrick and wooden dust-hins, which so often created nuisances. Among the matters which would in the future come under the control of the Sanitary Inspector instead of that of the police, was smoke abatement, and the speaker directed the particular attention of the Inspectors to the smoke nuisance.

In conclusion, Mr. Hutton called upon the Inspectors to do their duties in an earnest spirit. Let them not, he said, allow the fear or favour of any man to tone down their reports. The lives of so many people might depend upon their integrity. The only stock-in-trade of many an honest worker in this City was his physical strength. Let them think what the loss of that meant to such a man. It was in their keeping, and also in their keeping, humbly speaking, was the child-life of this modern Babylon.

A discussion followed on the customary resolution of thanks, which was proposed by Mr. H. Alexander, the Chairman of the Council. The motion was seconded by Mr. Tidman, C.E., who expressed some disappointment at not finding what he should be very glad to see put forward with the authority of the London County Council, a code prescribing proper sanitary appliances for houses generally. Thanks were due to Mr. Hutton for his generous offer to give half the amount of the ten guineas prize proposed to be given for the invention of a milk-can suitable for the retail trade. Mr. Pickersgill, M.P., Mr. Alderman Beacheroff, L.C.C., and Dr. Waldo supported the motion. Mr. Beacheroff thought that the services of the Sanitary Inspector could not easily be dispensed with, and that his office would be more permanent in the future, even where an Officer was not permanently elected. The proposed model by-laws had been forwarded long ago to the Local Government Board, which had kept them six months. There was an important provision in the Public Health Act which Mr. Hutton had not referred, namely, that the opening of any ventilation-pipe for drains must be at least 10 ft. above the highest window of any building.

The President (Dr. Richardson) wound up the discussion, and, in putting the vote of thanks, pointed to the rapid strides made in sanitary science during the last few years, and to the wider interest taken in the subject by the public and the press as proofs of real progress. He hoped Mr.

Hutton would live to see his suggestions carried out efficiently, and to feel that his life had been spent in a great and noble work. Mr. Hutton briefly replied, and the meeting then closed.

Correspondence.

To the Editor of THE BUILDER.

THE MANSION HOUSE.

SIR,—The fourth volume of Colin Campbell's "Vitruvius Britannicus" issued by the architects Woolfe & Gandon in 1767, contains illustrations (plates 41-43) of the London Mansion House, differing in several important points from the building as we now know it. In the first place the well-known Egyptian Hall exhibits the long since removed upper story with windows between Composite three-quarter columns (the "clearstory" as we may call it, to borrow a term from ecclesiastical architecture), and a flat ceiling, which, from its agreement with the description given by Vitruvius of what he terms an "Anla Egyptiaca," originated the once appropriate, but now misleading, name by which the Lord Mayor's banqueting-room is familiarly called. We see also a heavy balustraded gallery running round the hall, and carried across the great end windows. The Ionic Venetian windows below these, now only appearing on the exterior, were then open.

A still more important alteration from the original design is the conversion of the central open courtyard, reaching from the bottom to the top of the edifice into the present "saloon" familiar to the *habitués* of the Mansion House as the place where the Lord Mayor and Lady Mayoress receive their guests previous to the entertainments. This open court cut off the direct communication between the State entrance under the portico and the Egyptian Hall, which could only be reached through the "Long Parlour," the Lord Mayor's semi-state dining-room and state staircase (now done away with) to the left. The inner windows of these apartments now closed were then open to the courtyard, and were protected by a balustrade. The entrance corridor at the north end of the Egyptian Hall was entirely unshielded from the weather, and there are well-grounded traditions of the guests having their dresses sprinkled with flakes of snow on passing between the long parlour and the drawing-room. None of the many alterations in the interior of the Mansion House has tended more to the comfort and convenience of the building, and its adaptation for State occasions, than the transformation of the open *cortile* into a handsome covered saloon of reception.

Another change has been made in the removal of the State staircase, which led from the *piano nobile* to the bedroom floor, and the conversion of the space thus gained into a second drawing-room on the lower floor, and a State bedroom on the upper. The loss of the staircase is to be regretted, for the two existing staircases, east and west of the entrance corridor, are steep and not over wide, and are hardly worthy of the general stateliness of the building. But the addition of the second drawing-rooms is a real gain. Even now the two drawing-rooms are insufficient for the accommodation and comfortable circulation of a large party. The upstairs bedroom thus formed in the early part of the century contained the "State Bed," a wonderful specimen of the magnificent but heavy upholstery and drapery of the last century, but which in process of time had become such an unassailable lair for "murderers of sleep" of various species, that, after having baffled the attempts of successive Lord Mayors to rid it of its undesirable tenants, it was committed to the flames, and a more modest and more wholesome bedstead substituted for it. A comparison between this bedroom and the room adjoining, formerly a bedroom, but now the Lady Mayoress's boudoir, shows the difference of date, and proves that it formed no part of the original design. The walls are simply papered, and there is an entire absence of the rich door-cases and mural decorations which prevail through every part of the house. The change was evidently carried out

* "Vitruv. de Architectura," lib. vi., cap. 5, sec. 31. The name of the "Vitruvius Britannicus" contains illustrations of the Assembly-room at York, erected from Lord Burlington's designs, which still exhibit Vitruvius's idea of an Egyptian hall,—Corinthian below, Composite above,—mutilated. See also "Gentleman's Magazine," 1788, vol. ix., p. 605.

in a very economical manner, and all needless expense was spared.

The last particular in which the original building differed from the present is in the upper story, or clearstory, of the ball-room. This, which corresponded both externally and internally with the upper story of the Egyptian Hall, was removed not so many years ago, and an arched ceiling at a lower level substituted for it. The "ball-room" had long since ceased to be used for the purpose its name indicates. Balls are now given in the Egyptian Hall, and the old ball-room has become the supper-room.

It would be interesting to know the dates of these successive alterations, and the names of the architects under whom they were carried out. The records of the Mansion-House-Committee of the Corporation must certainly contain them. Might not a history of the Mansion House, with a notice of the chief events which have taken place there, such as public meetings, royal or distinguished receptions, and the like, form a companion volume to that issued by the Corporation on the Guildhall? E. V.

"THE INSTITUTE AND ARCHITECTURE."

SIR,—Mr. Fawcett's letter exactly expresses my own feeling at finding my name associated with a bitter attack on the Institute. Were registration in question it would be a different matter, but I hope and believe it is not.

A. E. STREET.

CHRIST'S HOSPITAL COMPETITION.

SIR,—Before it is too late, will you allow me, through your valuable Journal, to suggest to the Council of Almoners the desirability of selecting at least ten names for this competition, and divide the premiums as follows:—

- No. 1.—The execution of the works.
- " 2.—1000 premium.
- " 3.—2000.

And to the next six 1000 each.

This would meet with more approval in the profession generally, and give employment to many draughtsmen during the winter. I enclose my card.

"KUDOS" (ONE WHO WOULD COMPETE).

TRADES UNIONISM.

SIR,—It might have been supposed that trades unions, their methods and results, had been for many years too evident and notorious to admit of any intelligent person at all interested in the subject remaining ignorant on these matters. It seems, however, from the course of the Commission on Labour, and the queries addressed to witnesses therein, as reported by the public prints, that utter misapprehension, at least, still prevails among those who might be supposed to be, in these respects, unusually well informed.

Architects who during the half century or so in which these combinations have largely influenced the building trades have had to deal with contracts and contractors, know well that their effect has been both on workmen and work. At the risk of wearying you with a twice-told tale, I will ask you to allow me space in your columns to repeat what appeared in them from my pen about a generation ago, illustrating from facts well within my own knowledge the objects and character of trade-union proceedings, little changed since then, I believe, though apparently forgotten by or hidden from the present race of business men.

A very able and intelligent master-mason, known to me from his youth, had taken a contract for the stonework of a rather large building of the hospital class, designed with a continuous cornice, carried on moulded modillions, which formed the principal decorative feature of the building. These modillions or cantilevers had been estimated for at a price for each, and during some time elapsed ere the site was cleared the mason tested his price by putting one of his best men to work in his own yard on one of these, and timing his work on it. The man was occupied one day and three-quarters on this, and his master found that by the price charged this would pay him fairly well. Later, the mason's work was carried forward on the building on the cornice details; but, timed again by his master, he spent two days and three quarters on the same work. This was pointed out to him, when he replied: "Oh, yes; and I could do just the same now; but if I were to work faster than the man beside me I should be fined a guinea by the club."

Again, a plasterer—a first-rate master tradesman—had undertaken, by contract the ornamental ceilings of three contiguous shops. Stepping into one of these on a winter afternoon to see how the work proceeded, he stood in a corner to be out of the slop and splash. Here the fast-falling light nearly concealed him, and while he thus stood there came into the shop a man, a stranger to him, who

watched the men at work for a minute or two, then said to them, "I'll tell you what, my lads, you can't make this job hold out rather better, shall have to report you." Then the master scented himself with the question, "Who are you on which the stranger turned, and, as described me, "ran off like a hare." The "Inspector," if please, of the Plasterers' Union, on his rounds, see that all the work in that trade was duly delayed and dawdled over at the peril of a fine.

In another case a master mason with a business had an excellent out-door foreman, a Scotchman, as are many good workmen in trade,—a man who would insist on sound work for a proper amount of it per day. At a time when this master had a number of contracts on hand, a deputation from the men engaged on one of them told him on pay-day that unless this foreman, who "interfered so much with the work," were at once dismissed, all the men in his employ had agreed to strike. His engagements were such that he could not afford to face this, and so, vastly against his will, he had to part with his faithful helper, who once emigrated to North America (Canada, I think) where he believed trade tyranny would not prevent a man's working honestly. Another firm of builders taking general contracts, but chiefly known as pre-eminently excellent carpenters and joiners, had managed to keep their large workshops in the trades free from trades-union mischief, but in length received a series of most insolent letters, demanding, in high-sounding phrases, with much laxity of grammar and spelling, that information as to their dealings with their men and management of their business should be furnished to the writer, the secretary of the joiners' union. The matter appended seemed in some sort known to the recipients, and, looking through their old wages-lists they recognised it as that of a man turned out of their shops for stealing tools some two or three years before.

These are fair examples of the practice and aims of trade unions, involving "the principle" of that the worst workmen shall be paid as the best; that the best shall lower their standard of work; that of the worst, that no man shall venture to claim a preference as a superior hand, or do more work than the "club" permits, than any impudently vagabond who can write a blatant note to fit to represent their interests and bully the masters, and that the latter and the public who employ them are proper subjects for every form of fraud and conspiracy.

All confidence between masters and workmen is thus undermined, good work in all trades is put at a discount, and the enslavement, degradation, and demoralisation of workmen promoted and secured. SENEX.

COAL OR GAS FIRES?

SIR,—Your query, in last week's issue, to your correspondent's suggestion that we should all use anthracite coal is a very natural one. Your correspondent says nothing about the difficulty of burning anthracite in an open grate, nor about its cost or abundance in this country. He says: "Considering that anthracite is burnt so largely in America, it is a source of wonder to me that this unique coal, which is found in our own country, should have been so long neglected."

If your correspondent would compare the coal supplies of this country and America, he would find that the former is very abundant, and the latter comparatively speaking, is scarce. In England, bituminous coal is scarce. In England, bituminous coal occurs in larger quantities than anthracite. Hence coal-gas is dearer in America than in England, and consequently electricity, as a source of light and motive power, flourishes more in the former than in the latter country.

Upon the question under discussion,—viz., which are the better, coal or gas fires?—I would add that, having had experience with both, I have come to the conclusion, as a scientist, that a gas-fire in London, or other towns, where gas is as cheap and coal as expensive, is decidedly more economical than an ordinary coal-fire, if not required for many hours at a stretch. But, as a frail mortal, I must confess to having a great partiality for a roaring, wasteful, open coal-fire. Moreover, the endeavour to utilise the whole of the heat produced by the combustion of coal-gas has not now reached such a degree of perfection, that in many stoves there is not sufficient waste-heat to produce a strong updraught in the chimney. Consequently, when the wind is at all gusty, the unwholesome combustion products are blown at frequent intervals into the room, and, being invisible, are not noticed until they have worked the heat amount of waste-heat produces a strong updraught, and not only are all the combustion products carried up the chimney, but at the same time we have an excellent ventilator. H. F. H.

ANTHRACITE COAL.

SIR,—On page 444 of your issue of 3rd inst., your correspondent "R. S. R." suggests the use of "anthracite coal," which, he says, is without

* On this subject the reader may be referred to some remarks in the second article in this number.—Ed.

smoke, smell, or dirt. As I have upon several occasions endeavoured to use this coal in my portable, fixed, and traction engines respectively, I should like to say that, from my experience, I do not think this coal could be used for domestic purposes in an ordinary open fire-grate. It is a very hard coal indeed, practically non-gaseous, and without flame, and consequently will not burn unless with a strong draught. Then the heat is merely local, and has a tendency to burn one's fire-bars and bottoms out of the grates, all of which I think would be too troublesome for it to come into use for domestic purposes. The only manner in which it could be used, I think, is (and it is to this use the coal is put in America, so far as I understand) to burn it in the ordinary furnaces for heating water, which hot-water system would be carried all over the house, as in America, and heat obtained thereby, but this at once does away with the open, cheerful fires.

F. J. BANNEK.

THE SIX CLERKS' INN, CHANCERY-LANE.

SIR,—In a letter you printed on November 26, Mr. Blott seems to question John Kedermister's gift of Herleete's Inn to the Six Clerks. Sir George Bue's account forms chapter xxvi. of his "Third Universitie of England: or a treatise of the Foundations of all the Colleges, Ancient Schooles of Priviledge, and House of Learning, and Liberal Arts, within and about the most famous Citie of London . . ." dedicated to Sir Edward Coke. Bue describes Kedermister as "one of this Society [the Six Clerks], and a most skillfull man in his profession, and as faithfull a man to his friends and clients as ever was in his place, as I can testify by good proofe." His treatise will be found at the end of Edmund Howes's "Annales," a continuation of Stow's Survey, as printed in black letter, 1631, folio. I believe it is printed also in the 1615 edition of Howes's book. Having succeeded Edmund Jynney as Master of the Revels in 1610, Bue died in 1623. In Bray's edition of Manning's "Survey," III. 425 (1814), it is mentioned as a monument in St. Giles's parish church, Camberwell, to Sir Peter Scott, Knt., ob. 1622, recording that "Hee married Elizabeth eldest daughter of Edmund Kedarmister, Esq., one of the six Clerkes of Chancery." Strype, in Book III. p. 263, of his Survey (1720) says:—

"On the west side of Chancery-lane sometime was an house pertaining to the Prior of Necton Park, a House of Canons in Lincolnshire. This was commonly called Herleete Inn, and was a Brewhouse; but now fair builded for the Six Clerks of the Chancery, and standeth over against the said House, called the Rolls . . ."

W. E. D. M.

The Student's Column.

CONCRETE.—XXIV.

PAVING AND FLOORS.

THAT will be best at the outset to divide the subject into two parts, namely, paving, —which is a floor-surface resting on solid ground, and floors, which we will take to mean floors over voids.

Paving.—The use of concrete for paving is extending rapidly both in buildings and in streets. Miles upon miles of footpaths in London and elsewhere have been formed with concrete, either deposited *in situ* or laid in the shape of flags. And although we could point to many failures of concrete deposited *in situ*, to great cracks and honey-combed surfaces, yet, on the other hand, we could point to paving which, after years of heavy traffic, seems as perfect as it did a month after it was laid. One objection, which is frequently raised against a concrete footpath deposited *in situ*, is the difficulty of cutting through it whenever it is necessary to connect the drains, or water-pipes, or gas-pipes of buildings adjoining the footpaths with the mains in the streets, and the further difficulty of making the paving good after it has been so cut. This objection has had so much weight that most town-surveyors or engineers prefer to use the concrete in the form of flags, and the manufacture of such flags has within recent years been considerably extended.

The patent Victoria stone is a well-known kind of concrete, and consists of one part of Portland cement and three parts of "granite" chippings not much larger than peas; the mixture is cast in metal-lined moulds, and then stepped in a solution of silicate of soda. The blocks are afterwards washed with clean water and allowed to harden before use. Part of the silica of the solution is given up and combines with the free lime of the cement, and apparently hastens the induration of the concrete. The compressive strength of this stone

is said to surpass that of the best sandstones; while, in imperviousness, it is said to be better than Bath and Portland stone, about equal to the best sandstones, but considerably inferior to granite, syenite, and good trap and basalt. The "granite" used in the manufacture is really a syenite from the Groby quarries in Leicestershire, which, according to Rivington's Notes, weighs 1734 lbs. per cubic foot.

The Imperial stone, formerly known as Silicated stone, is another well-known concrete. It consists of 1 part Portland cement mixed with 3 parts granite crushed in Blake's crushers until the largest dimension of any piece does not exceed three-eighths of an inch. The process of manufacture is very similar to that of the Victoria stone, in both cases a bath of silicate of soda being used.

Granite-concrete flags of good quality are also made by Messrs. W. B. Wilkinson & Co., by The Croft Granite, Brick, and Concrete Co., and by Stuart's Granolithic Paving Co. The durability of such paving is beyond question. It does not crack or scale away, and has a hard dense structure. Some artificial paving can be obtained with impressed patterns, which have a good appearance and improve the foothold, while other pavings supplied in various colours, and can then be laid in simple patterns. The usual thickness of artificial flagging is from 2 in. to 2½ in., the usual breadth is 2 ft., and the length varies by 6 in. from 1 ft. 6 in. to 3 ft. 6 in. Mr. Lascelles advocates the formation of an air-space under artificial flagging in dwellings by means of small concrete piers, on which the corners of the flags are supported; this air-space prevents the rising of damp through the floor.

But while artificial flags are useful for the footways of streets, there are many situations in which a jointless slab of concrete is much better, such as the floors of basements, or of rooms, on the solid ground, or of stables, cow-houses, &c. In these cases a floor is required which, while having a durable surface, also prevents the rising of moisture and of unsoiled gas, and the percolation of foul water and sewage into the ground beneath. Some kind of concrete flooring, which can be deposited *in situ*, and without joints, should then be adopted. If a specially durable kind be required, it may be specified to be laid by one of the firms already mentioned, for all these firms undertake such *in situ* paving. The Patent Victoria Stone Co. prefers a foundation of broken brick about 4 in. thick, upon which is laid in one operation a layer of concrete 2 in. thick, composed of 1 part Portland cement and 3 parts finely-crushed and machine-washed granite. This paving is not treated with silicate of soda in any way.

Another kind of *in situ* paving is laid by the Imperial Stone Co., and is known as "Petro-silicon." Where heavy traffic is expected on the paving soon after it is laid, the surface is treated with silicate of soda in order that the hardening may be hastened. No list of paving would be complete if mention were not made of Stuart's Granolithic Paving, which has achieved a world-wide reputation, and is used with equal success in buildings or in the open air.

The following method is recommended by Messrs. W. B. Wilkinson & Co. When the ground, after being excavated to the proper depth, is soft, it must be well rammed, or, in bad cases, a layer of common concrete may be laid, the upper surface of which must be 6 in. or 7 in. below the intended finished floor-line. On consolidated ground, a layer of brick-bats or stone-rubble is spread and then broken, so as to form a layer about 4 in. thick; the breaking helps to consolidate the ground still more. (When a common concrete foundation has been laid, the brick-bats or rubble should be broken before being spread.) There should be no soil or small stuff among the broken material, and this should be laid roughly to the various gradients required. On the broken material, the proper concrete pavement is laid down soft and finished with a smooth or grooved surface as required. For moderately light traffic, as in coach-houses, warehouses, footpaths, gentlemen's stables, &c., the paving is usually laid about 2 in. thick, and a thickness of 3 in. is found enough for the heaviest horses, carts, rolling casks, &c. For stables, stable-yards, conservatories, sloping-ground, and other places where liquid-mannure or water would otherwise spread over the whole surface, or where a good foothold is necessary, the surface of the concrete is indented or grooved in various patterns,

and channels are formed for drainage where required.

The expansion and contraction due to change of temperature frequently cause cracks in large areas of paving exposed to the weather. The difficulty can be overcome by forming the paving into separate slabs by means of lathe about ¾ in. thick, placed in the concrete every 8 ft. or 10 ft.

A common method of forming basements, especially in towns where a 6-in. layer of concrete over the whole site of a building is required by the by-laws, is to deposit concrete 5 in. or 6 in. thick, and finish the surface of this in one of the various ways hereafter mentioned. As this concrete is intended to keep down moisture and unsoiled air, it should be as impervious as possible, and for this reason a considerable quantity of sand and small gravel should be used in its composition, so that all interstices may be well filled. For instance, the concrete might consist of 1 part Portland cement or good hydraulic lime, 2 parts clean sand, 1 part pea-gravel, and 3 parts gravel, stone, or brick, broken to pass a 1½-in. ring.

Where brick paving is adopted for stables, &c., it is best to deposit for the reception of the bricks a layer of concrete, laid to the proper gradient. The surface of the concrete can be finished with a ½-in. coat of cement mortar (1 to 1, or 1 to 2), in which the bricks can be bedded; the joints of the bricks should be carefully made with the same mortar and then grouted over with neat cement grout.

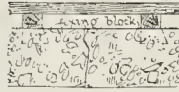
Floor Surfaces.—Similar concrete beds, with perfectly level surface-coats of cement mortar, are required to receive floor-tiles, mosaic, wood-blocks, &c. In the case of wood-blocks, when the surface-coat is hard a layer of bituminous composition must be spread upon it to receive the blocks. There are, however, several systems of wood-block flooring in which metal keys are inserted in the concrete for the purpose of securing the blocks, or in which small cubes of wood are inserted to which the blocks can be secured with screws or metal discs. In basements and outbuildings, the surface of concrete floors can be economically finished with a thin coat, ½ in. or ¾ in. thick, composed of Portland cement and clean coarse sand or sharp grit, well trowelled. This ought to be applied before the concrete has set, in order that the whole may set into one mass. Such a facing, however, wears somewhat rapidly, and gives rise to a considerable amount of dust. Granite sand gives better results than ordinary sand. Clean crushed crystalline limestone, quartz, and granite from which all dust and sand have been removed form good aggregates for surface-coats. They should be mixed with neat Portland cement in the proportion of 1 part cement to 2 parts aggregate, and should be laid to a thickness of 1 in. or 1½ in., well beaten, and trowelled to a smooth surface. Sometimes coloured glass and marble are used as part of the aggregate, and frequently colouring matter is mixed with the cement. Mr. Hanson, Lockwood of Manchester, has finished many concrete floors in this way, white spar, coloured glass, and marble being imbedded in a red or blue matrix, and the whole being afterwards well polished. These floors are ornamental and extremely durable.

When a polished floor is required, cubes (varying, say, from the size of peas to the size of small filberts) should be used. Cubes of granite, &c., screened through two sieves (the one to eliminate the fine particles, the other the large pieces), and with the irregular-shaped pieces picked out by hand, can be obtained for the purpose. Care must be taken that the fine dust, found during crushing, is washed from the aggregate.

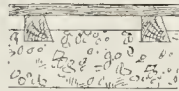
Building-owners frequently exhibit a partiality for ordinary hoarded floors, even when fire-resisting construction is adopted. Sometimes ordinary boards are laid upon the concrete layers in basements without any intervening joists or bituminous composition. Such floors should have a first layer of good dry broken stone or brick, then a layer of ordinary concrete 3 in. or 4 in. thick, and finally a 2 in. layer of coke-breeze concrete (1 to 4), brought to a perfectly-level surface. When this has dried sufficiently, which will not be in less than three or four weeks, the floor-boards can be laid and nailed directly to the coke-breeze concrete. Mr. C. F. Moxon, in the *Builder* for Sept. 8, 1888, declares that there is no danger of dry-rot; we think, however, that a thin coat of bituminous composition, spread over the concrete as for wood-blocks, would be an additional

safeguard. For upper floors, of course, there is no reason why the boards should not be nailed directly to the concrete, if coke-breeze concrete be used.

Where the floors are not composed of coke-breeze concrete, some other method must be adopted. Sometimes strips of coke-breeze concrete are laid upon the other concrete, and to these the boards are nailed, or small dove-tailed wood-blocks are inserted in the concrete, to which small wood fillets (2 in. by 1 in., or thereabouts) are nailed, and to these the boards are



secured, as in fig. 10. Substitutes for the wood-blocks can be found in Wright's concrete fixing blocks, or in Jabez Thompson's brickwood fixing blocks. Sometimes the fillets themselves are cut to a dove-tailed section, and imbedded



in the concrete, as in fig. 11. Objection is frequently taken to the cavities left in the floors by the various systems of boarding on wood fillets. Certainly they harbour dirt and vermin, and are, therefore, sanitariously imperfect, but they have the advantage of deadening the sound to some extent, and in solid concrete floors the transmission of sound is a great disadvantage. When necessary, the cavities can be filled with coarse concrete, slag-wool, &c.

GENERAL BUILDING NEWS.

JUNIOR CONSTITUTIONAL CLUB.—This new clubhouse in Piccadilly, which was opened for the use of members on Monday last, occupies the site of four houses between the Badminton Club on the east, and Sir Julian Goldsmid's house on the west, with a superficial area of about 11,000 ft. The basement contains kitchen, 53 ft. by 24 ft., with larders and other offices surrounding it. On this floor also are the wine cellars and servants' hall, and rooms for men-servants, as well as a considerable space devoted to steam-boilers, pumps, &c. On the mezzanine floor over, which is on the level of Yarmouth-mews, are arranged stewards' offices, and rooms for the upper servants, still-room, and members' lavatories, &c. The ground-floor is raised about 7 ft. above the level of Piccadilly, and contains in the front a smoking and morning-room 55 ft. long by 23 ft. wide, and 22 ft. high, divided by white marble columns with deeply recessed bays. At the back is a hilliard-room with three tables. The entrance-hall is placed at the east end facing Piccadilly, with an entrance-door of Ross of Mull granite, flanked with large Shap granite columns. From this, by a flight of marble steps, a spacious vestibule is entered, off which is a reception-room for the use of the friends of members. The vestibule opens into an inner hall, 44 ft. by 30 ft., divided by large red marble columns which mask the marble staircase leading to the first floor. This staircase is 10 ft. wide, and is entirely of white marble with Walsort marble balusters, while the walls of the whole of this, as well as the inner and outer halls and the wide vestibules on the principal floors, are lined with Walsort and clouded vein marble. The space for service on each floor is arranged centrally, with service, wine, and luggage lifts to every floor from the basement and service staircase. A hydraulic elevator for members goes to each floor. The architect to arrange various rooms for servants, &c., in dividing mezzanine floors over the back portions of the building. On the first floor the grand staircase leads to a large central landing 24 ft. by 20 ft., off which on the left is the Morning Room, 72 ft. long by 25 ft. wide, divided into unequal portions by columns, with the back part raised some 2 ft. or 3 ft., which breaks the length of the rooms. The grand dining-room is L shaped, the front portion with deeply recessed bays, being 55 ft. by 28 ft., and 20 ft. high, and divided by marble columns, with elaborately-designed fireplaces and mantels at either end. The returned portion of this room is 60 ft. by 25 ft., giving a total length of 145 ft., and is so arranged that it

can at any time be used for meetings. On the second floor is a library 60 ft. by 25 ft., fitted up all round with designed book-cases and high metal-pieces, and in addition are drawing, music, committee, and dining, card and private billiard-rooms, and rooms for the secretary and staff. On the three upper floors have been arranged between sixty and seventy bedrooms, for the use of members, and rooms for servants. The whole of the building throughout, including the roof, is of first-class construction, carried out from the architect's designs by Messrs. H. Tomlin & Rodgers. The exterior has an imposing facade facing Piccadilly, with three boldly-designed bays with gables over, the whole front being faced with white Norwegian marble, with Portland stone freely used in the general dressings and cornices throughout. Ross of Mull and Shap granite being used in the large columns on the ground floor, and for the smaller shafts of the more important windows. The general design of the facade is Italian Renaissance, freely treated. The whole of the building throughout, including the internal decorations and fittings, have been designed by Colonel Robert W. Edis, F.S.A. The general contractors' work has been done by Messrs. Bywaters & Sons, the marble work throughout as well as the furnishing by Messrs. Maple & Co., the internal sanitary and engineering work by Messrs. Matthew Hall & Co., the ornamental plastering work by Messrs. Jackson & Sons, the kitchen fittings by Messrs. Wilson & Son, the elevator and lifts by the American Elevator Company, the whole of the marble and stone front having been executed under the general contractors by Messrs. Burke & Co. The new building is entirely lighted with electric lighting by Messrs. Edmundson & Co., and the principal rooms are fitted with elaborate electric fans, carried out from the architect's designs by Messrs. Starkie, Gardner, & Co., and Messrs. Rashleigh, Phipps, & Dawson.

SCHOOL, DARLSTON.—We are informed that plans for new infant school, All Saints, have just been approved by the Education Department. Mr. Henry E. Harmer, of Darlston, is the architect.

NEW WORKHOUSE AT PATRICROFT.—On November 30, being the forty-third anniversary of the formation of the Barton Union, the Barton Board of Guardians laid the foundation-stones of the proposed new workhouse at Patricroft. This, when completed, will afford accommodation for at least 500 inmates, and the cost of the new buildings will be over 30,000. The site, inclusive of the present premises, will cover an area of over six acres. The stone on the north-east side of the principal entrance of the administrative block was laid by Mr. S. J. Reade, Flixton (Chairman of the Board), and that on the south-west side by Mr. Noah Robinson, Swinton (Chairman of the Workhouse Extension Committee). The Guardians have found it advisable to build the workhouse in sections, and the first comprises the wards for the aged, infirm, and able-bodied, and the administrative block. The tender for the erection of the first section has been let to Messrs. Southern & Sons, Salford, for 16,250*l.*, and is to be completed by April 1 next. The proposed buildings will be plain but substantial. Messrs. Mangnall & Littlewoods are the architects. In his address Mr. Reade (the Chairman) stated that the Guardians purchased the mill of Messrs. Moore & Waddington, the site of which, at new workhouse premises, for the sum of 3,500*l.*, and the sale of materials and machinery realised 4,750*l.* Several blocks of cottages have been purchased for 7,145*l.*

BOARD SCHOOL, LEITH.—The new public school in Great Junction-street, Leith, was opened on the 17th ult. by Mr. Munro Ferguson, M.P. At the Dr. Bell's school in Great Junction-street from the Craig, architect, Leith, to add a large wing behind the old building, of which as much as possible was desired to be retained, but to be so altered as to meet the requirements of modern school life. The larger portion of the old school, which is one story high, has accordingly been preserved and divided by glass screens into three class-rooms for the accommodation of infants, while the added wing is six of the rooms being separated by movable glass screens. The original Gothic facade, skirting the street, with the statue of Dr. Bell in a niche, has not been altered in appearance, and the architecture of the new masonry has, it is stated, been made to harmonise with it. A staircase ascends from the halls and landings are built of iron and concrete. On the upper floor are the sewing, music, and cookery-rooms, while other rooms have been set apart for a library and museum. The walls of the halls, corridors, lavatories, and cloak-rooms have a dado of tinted glazed tiles, and the class-rooms a dado of varnished pitch-pine. The school will give accommodation for 1,082 pupils, and the cost is expected to be about 3,000*l.* Messrs. Kinneir, Moodie, & Co. were the builders. On the vacant ground on the west side of the school a swimming-bath for the use of the scholars is to be constructed at a cost of 2,000*l.*

ST. BARNABAS'S CHURCH, MIDDLESBROUGH.—On the 19th ult. the Archbishop of York consecrated the Church of St. Barnabas at Linthorpe, Middlesbrough. The church is in an unfinished state, the chancel, organ-chamber, and

south aisle having yet to be built; but the nave, two aisles of six bays, and the south porch have been completed. The cost of the church so far amounts to about 3,000*l.* The church is built of brick, with stone dressings. The walls, which are open, are of dark stained wood, and seating accommodation is intended in the whole church for 750 persons, the portion already built accommodating about 500. The architect is Mr. C. Hodgson Fowler, of Durham; and Mr. W. Basiman, Linthorpe, Middlesbrough, is the contractor.

HIGHER GRADE SCHOOL, WOLVERHAMPTON.—According to the *Wolverhampton Chronicle*, the foundation stone of the Higher Grade School which is being erected in the New Hampton-road, Wolverhampton, was laid on the 21st ult. The buildings consist of a main block two stories high, with a side wing also two stories in height, besides workshops and covered playgrounds behind the main building. The main block is arranged on the central hall system. The principal entrance is from the New Hampton-road, and this also forms the entrance for boys, provision for whom is made on the ground floor. The central hall is 67 ft. by 34 ft. by 42 ft. high, and is open to the roof. For the elementary education for boys six class-rooms are provided, 25 ft. by 24 ft. 8 in., also one class-room 29 ft. by 24 ft. 8 in. There is a headmaster's room, two teachers' rooms, and accommodation for hats and lavatories. The girls are provided for on the first-floor, with a principal entrance from the side street. Four class-rooms are provided. These all communicate with a gallery carried all round the central hall. Rooms for the head-mistress and for pupil teachers, with lavatory accommodation, are provided for this department. On this floor is a cookery-room, 32 ft. by 24 ft. 8 in., with scullery and store-rooms, also an ar-room, 25 ft. by 24 ft. 8 in. There will be five small music-rooms and store-rooms for books and utensils. The side wing will be occupied on the ground floor by a chonical lecture-room, 29 ft. by 28 ft., with an additional room for preparing for experiments, &c., and on the first floor will be the chemical laboratory, 35 ft. by 29 ft., and physical room, 31 ft. by 18 ft. 6 in. The buildings will be executed in red brick, relieved by terra-cotta. The roofs will be covered with green slates, and the whole of the interior joinery will be of red deal, painted. The contract for the building has been let to Mr. H. Lovatt, contractor, of Wolverhampton, and the work is being carried out under the superintendence of Mr. T. H. Fleeming, architect, Wolverhampton.

FOREIGN AND COLONIAL.

FRANCE.—We regret to have to announce the death of Pierre Victor Galland, the well-known decorative painter. He died suddenly two days ago at the age of seventy. He was Professor of Decorative Art at the Ecole des Beaux-Arts, director of the works of art at the Gobelin manufactory, and Member of the Superior Council of Fine Arts. We shall speak more fully of him in our next Letter from Paris.—The death is also announced, at Lyons, of Gaspard Poncet, who executed the cartoons for the mosaics in the cathedral at Fourvières.—After three tours of inspection, the Académie des Beaux-Arts has just elected the painter, Olivier Merson, in place of the late M. Signes, who died on the 24th ult. It was given to M. Carolus-Durand, and one attributed to M. Benjamin Constant. The new Academician was born in Paris in 1846. He was a pupil of Pils, and of Chassevent, and obtained the Prix de Rome in 1869. He received a first medal in 1873, the Legion of Honour in 1881, and a gold medal at the Exhibition of 1889. His father was much thought of as an art critic.—The funeral monument of the sculptor Charles Gauthier has just been inaugurated in the Montparnasse Cemetery. The monument is decorated with a bust by M. Blanchard.—The monument of Théodore de Banville, which has just been inaugurated in the Luxembourg Garden, is the joint work of M. Courtois and M. Rouleau, the former designing the pedestal, the latter the sculpture. The bust of the poet rests on a marble pedestal, which is in the form of an antique altar, with a lyre and palm, encircled with roses.—The whole thing is very charming and original.—The National Society of Architects has just given judgment on its annual competition. The subject given was "A Lodging-house in the XVIIth Arrondissement" (Batignolles). The first prize was awarded to MM. Victor Collas and Henri Daudane, the second prize to M. Germain Madanle, and the third to M. Paul Martin.—The M. M. Besnard, Aubler, Machard, and Renouf, painters, and M. Louis Nèel, sculptor, have just received medals of the first class from the judges of the Exhibition of Fine Arts at Madrid.—The General Council of the Seine has just acquired a statue by M. Hercule exhibited in 1887, representing a sailor defending the flag. This statue will be erected at Charente-le-Inférieure, in commemoration of the victory by the sailors against the German Army in 1870 at the Gare-aux-Bœufs.—An exhibition of the "no-impressioniste" painters is to take place shortly at 32, Boulevard Poissonnière.—A certain number of Russian painters are proposing to have an exhibition of their works during

the coming year.—There is a talk of erecting a monument to Carbonne (Haute Garonne) to the memory of Charles de Rémusat, French politician, who, after the war of 1870, was sent to Berlin to discuss the question of the occupation of territory.—The committee formed for erecting a monument to the memory of the celebrated sculptor, Barye, has just definitely settled the project for the monument, which will comprise a large scale ornamented with a medallion of the artist, and reproductions of his principal works; on the right and left will be the groups of Peace and War, in front will be his well-known lion, and on the summit the group of Theodosius.—A fine art exhibition will be held at Moulins (Allier) during the course of next year.—The death of M. Bouloguet, architect, is announced at Bourdeaux. He was a member of the Société Centrale.

BERLIN.—A part of the old "Dom," which is being demolished to make room for the new cathedral, is being cut up into paper-weights, which are to be sold with the Emperor's consent for the benefit of a charity. Patriotic citizens will thus be able to buy souvenirs of an architectural building which for many years could boast of being Berlin's greatest eyecore.—A fine host of the late Professor Martin Gropius, better known as the head of the Berlin firm of architects, Messrs. Gropius & Schmieidow, has been presented to the "Architekten Verein," and has been placed in position with much ceremony. Professor Gropius gave much attention to the design of the Arts and Crafts Museum at Berlin, and to the unique Concert Hall at Leipzig.—Besides the enormous sums to be spent on public works by the several German States, the Imperial Government, as such, will during the coming year have an outlay of about 5,300,000,000. Barracks, store-houses, factories, &c., for the army will cost some 2,100,000,000; works for the Imperial railways some 400,000,000; and the North Sea-Baltic Canal will require 1,600,000,000. The Budget, of course, only covers the work actually to be done in the course of the year, which in most cases is but a small part of the extensive schemes in hand. Next to the North Sea-Baltic Canal scheme, one for new sea-houses for the Army Commissariat Department perhaps ranks first.—Dr. Werner von Siemens, the eminent electrician and inventor of the pneumatic tube system, died on Tuesday at the age of seventy-six. He was a most popular figure in Berlin architectural circles, to whom he was also known as honorary member to the Prussian Academy of Works, and as technical jurymen on many architectural competitions of importance. In Dr. von Siemens artists lose an influential friend and patron. We gave some account of his life and work not long since (*Builder*, October 22, 1892).

MISCELLANEOUS.

THE PAINTING AT WENHASTON CHURCH.—By the permission of the Society of Antiquaries, the large ancient painting, 17 ft. by 53 ft., on oak, "The Judgment," recently discovered in Wenhaston Church, will be on view at the rooms of the Society, Burlington House, for a week from Thursday, December 15, in the evening of which day a paper on the subject will be read by Mr. C. E. Keyser, F.S.A. The Rector and Churchwardens of St. Anne's, Soho, have kindly consented to allow the Vicar of Wenhaston to exhibit the painting, which excited great interest in the Eastern Counties, at their school-room, Dean-street, Soho (close by Piccadilly-circus, Shaftesbury-avenue, and Oxford-street), from 10 a.m. to 4 p.m., and from 8 p.m. to 10 p.m., on the 23rd, 24th, 26th, and 27th of December. A small charge for admission will be made at the Soho Schools on behalf of the restoration of Wenhaston Church.

THE LAW AS TO BUILDING SOCIETIES.—At the weekly meeting of the Balloon Society, held at the St. James's Hall, on Friday evening, December 2, Mr. Thomas Richards, solicitor, delivered an address on "The Uses, Abuses, and Reform of Building Societies." The chair was taken by Mr. Montagu Holmes, F.S.I., who made a few opening remarks. Mr. Richards called attention to the Building Societies Act of 1836, which first gave Building Societies a legal status, and then to the privileges conferred on building societies by the Act of 1874. He stated that, as solicitor to several building societies, and as an ex-secretary to a society, he had had opportunities of forming an opinion on the various reforms, which he suggested should be included in a new Act of Parliament. They were:—1. That the amount to be lent on any one property should be restricted to 1,000l. 2. That the amount to be lent to any one borrower should also be restricted. 3. That each society should publish annually the number of mortgages representing its assets. 4. That each society should show in a separate item in its balance-sheet the number of properties on hand and the amount of principal due thereon. 5. That it should be illegal for any society to lend on second, or subsequent charge (except by way of collateral security). 6. That it should be illegal for any society to lend to a limited liability company, or to the reserve fund (if any) should be invested in trustee's securities (other than on mortgage), so as to be readily convertible. 8. To provide for a more efficient audit,

and supply a separate form of balance-sheet to be used by permanent and terminating societies. 9. That a certain portion of deposits should be lent on ordinary mortgages at three months' call, so that the society can (if necessary) call in its principal to repay depositors, or transfer its mortgage to a private mortgage. 10. That District Councils should be appointed to periodically call on building societies to see that they conform to law (just as banks send inspectors to their branches). Mr. Richards stated that if some of these provisions had been included in the Act of 1874 it would have been impossible for the Liberator Society to have been in the position it was in to-day. He thought that the restrictions suggested on any one property was the most important of all. Building societies were intended to aid the working classes to become their own landlords, and not to encourage speculation in large properties. It was bad to have too many eggs in one basket, and where societies lent sums averaging 400l. or 500l. to persons purchasing houses for occupation almost on the "one man-one house-principle," they could not go far wrong. Fifty millions sterling was invested in building societies having over 600,000 members, and surely this formed part of the wealth of the nation, and the subject was sufficiently important to call for a Parliamentary inquiry, when witnesses had been examined and almost every restriction, and a new Act of Parliament framed to make building societies more useful in the future than they have been in the past. Building societies had done good work in the past, and would do more good in the future. The following resolution was then passed, on the motion of Mr. Peard, seconded by Mr. G. G. Gwynne, and almost regarded as the largest amount of savings of the thirty invested in building societies, amounting to over fifty millions sterling, it is a matter of urgent public importance that a Parliamentary inquiry should immediately be held as to the causes of the recent failures of building societies, with a view to such early legislation as will (if possible), prevent a recurrence of the same, and tend to protect the savings of the thrifty.

CHANCEL-SCREEN, ST. ALBAN'S CHURCH, LEAMINGTON.—A fourteenth century chancel-screen was unveiled at St. Alban's Church, Leamington, on the 20th ult. The screen consists of a series of five cusped main arches, the centre one, forming the entrance to the chancel, being much larger than the two on each side. Over these arches there are canopies with carved crockets and finials and light open tracery, surmounted by an embattled cornice. The centre canopy rises higher than those at the sides and is surmounted by a cross with carved terminations. The work has been executed in best wainscot oak by Messrs. George & Gwynne, of North Walsham, from the designs of the architect, Mr. W. Basset-Smith, Adolph, London.

IMPROVEMENT SCHEMES FOR ABERDEEN.—A draft of the Parliamentary Bill which the Town Council of Aberdeen are to promote in the ensuing session for powers to execute certain public works is in course of completion. The Bill provides for the extension of the gas and water works, the erection of new police buildings, and seeks to give the Town Council complete proprietary rights to the Old Town Links. A sum of 100,000l. is set down for the gasworks extension, but twenty years may elapse before the whole of this sum is expended. As to the waterworks, it is proposed to extend to the Town Council to create special drainage districts, and to acquire land for treatment by irrigation with the sewage of the principal villages on Deeside west of Invercaunie. Powers will also be sought to enable the Town Council to compel the authorities of these villages to have the sewage conveyed to a main sewer which will be laid by the Council, in order that it may all be carried to the irrigation lands instead of being allowed to run into the river. There is also the provision of a new settling-pond, &c., and the scheme is estimated to cost close upon 100,000l. The Bill deals further with the erection of new police buildings, including barracks for the accommodation of a portion of the force, and these buildings will cost about 10,000l. Altogether, the projected schemes will, it is estimated, involve a total outlay of no less than 230,000l.—*Scotsman*.

THE ENGLISH IRON TRADE.—There has been little alteration in the English pig-iron market, although the favourable nature of the Cleveland Ironmasters' Return imparted a firmer tone to several districts during the earlier part of the week. Prices have, however, since weakened, and business generally throughout the crude-iron department is quiet. In finished iron few transactions are recorded, and quotations are less firm. Nipples are also quieter. In steel but slight changes have taken place. Shipbuilding and engineering maintain few alterations. The coal trade is slightly brisker.—*Iron*.

PUBLIC SHOWER-BATHS.—In the Berlin Health Exhibition of 1883 Dr. Lassar exhibited a shower-bath designed for use by the public. The conditions laid down to be observed in the case of public bathing establishments of this character are:—Separate baths for each person to be provided at such a cheap rate as to be accessible even to the poorest classes; to be a cleansing bath, and permit the abundant use of soap; and, lastly, the bath must be rapidly prepared and capable of

being quickly used, as the time at the disposal of the bathers is generally very limited. The system devised by Dr. Lassar has been adopted extensively in Germany, at Berlin, Magdeburg, Frankfurt, and many other towns, with marked success. New baths of this kind have been designed for Brunswick. The site is covered by a one-story building, occupying an area of 46 square feet. Half the space has cellars beneath. Fewer women than men are found to use the baths; so there are fifteen shower and two slipper baths for men, and six shower and one slipper bath for the women. Some of the women's compartments contain seated douche-baths. The heating apparatus for the water is a vertical boiler with 16 metres of heating-surface. It is placed in a cellar, and the water circulates from it to the roof. A hot-air apparatus warms the building and heats the drying-stove for linen. The compartment for each bather is 8-2 ft. by 4-3 ft. The hot-water douche flows through a 50-millimetre pipe, the top being of special construction, so as to limit the supply and prevent waste. The supply of cold water is not limited. The charge for each shower-bath, including use of soap and towel, is 1d.; and for a slipper-bath the charge is 2d. The total cost is 1,350l., or 56l. 5s. per bath cell.

BRICK STREET PAVING.—In 1891 there were eleven miles of streets in Philadelphia laid with a paving composed of vitrified brick. According to the report of the Chief of the Bureau of Highways of that city the brick costs about one-fifth less than asphalt, and it always presents a non-slippery surface. The chief difficulty is that the brick is not always of a uniform density. The bricks are joined together by Portland Cement, which is found to be superior to the pitch formerly used.

LEGAL.

WORKMAN'S CLAIM FOR PAY IN LIEU OF NOTICE.

The *City Press* of Wednesday last reports that, at the Mansion House Police-court, a labourer named Baker sued Mr. B. E. Nightingale, builder, for one hour's pay in lieu of notice.

Baker, in stating his case, did not assert that notice had not been given him, but admitted that as soon as he received it he ceased work, with a view, he said, of cleaning up his tools, and, although requested by the foreman, refused to resume work, claiming his right to do so under rule 5 of the new working rules for the building trades of London.

The Lord Mayor, without calling any further evidence, said such an interpretation of the rule was preposterous, and at once dismissed the case.

MEETINGS.

THURSDAY, DECEMBER 10.

Institution of Civil Engineers.—Students' visit to the Machinery and Inventions Division, South Kensington Museum. 2 to 4 p.m.

MONDAY, DECEMBER 12.

Society of Arts (Cantor Lectures).—Professor Vivian B. Lewis on "The Generation of Light from Coal Gas." IV. 8 p.m.

City and Guilds of London Institute.—Presentation of Prices and Certificates, Merchant Taylors' Hall. 7.30 p.m.

Clerks of Works Association (Carpenters' Hall).—Paper by Mr. G. H. Hughes. 8 p.m.

TUESDAY, DECEMBER 13.

Institution of Civil Engineers.—(1) Further discussion on Mr. John Rydy's paper on "The Manufacture of Small Arms." (2) Time permitting, Mr. J. Emerson Dowson on "Gas Power for Electric Lighting." 8 p.m.

WEDNESDAY, DECEMBER 14.

Society of Arts.—Professor George Forbes on "The Utilization of Niagara." 8 p.m.

St. Paul's Ecological Society.—Objects of ecological interest to be exhibited and described. 7.30 p.m.

Edinburgh Architectural Association.—Mr. T. Crichton-Fulton on "The Electric Lighting of Large Buildings." 8 p.m.

THURSDAY, DECEMBER 15.

Society of Antiquaries.—8.30 p.m.

FRIDAY, DECEMBER 16.

Architectural Association.—Mr. F. Inigo Thomas on "The Formal Garden." 7.30 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

15,643.—DOOR CHAINS: *W. G. Cooch*.—This invention has for its object improvements in Door-chains, the chain-bolts being made adjustable and self-locking, so that in whatever position the chain may be placed the door to which it may be attached can only be opened the distance required, while the greater the pressure upon the door the tighter the chain becomes locked in the slide. The inventor provides an ordinary shaped slide, which is attached to the door in the ordinary position, as is also the chain to the door-post, but upon the loose end of the chain, in place of the ordinary button-end, the following is provided:—T) the

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Competition Design for St. Luke's Church, Wintonington.—By Messrs. F. C. Eden and J. L. Williams.....	Double-Page Ink-Photo.
Design for a Town Mansion.—By Mr. Herbert Baker, A.R.I.B.A.....	Double-Page Ink-Photo.
Interior of a Library in London.—Mr. G. Aitchison, A.R.I.B.A., Architect	} Double-Page Ink-Photo.
Dining-room, House at St. Sebastian, Spain.—Mr. R. Seiden Wormum, Architect	
House at Eastbourne.—Mr. F. W. Waller, Architect.....	Single-Page Photo-Litho.
Lodge and Gates, House at St. Sebastian, Spain.—Mr. R. Seiden Wormum, Architect.....	Single-Page Photo-Litho.

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Sketch for Panel in Wood or Metal Work.—By Miss E. M. Roff.....	Page 477	Plan of Competition Design for St. Luke's Church, Wintonington.—Messrs. F. C. Eden, B.A., and J. L. Williams, Architects.....	Page 473
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The Temple of Bubastis.



THE annual volume issued by the Egypt Exploration Fund consists this year of a description of the researches made on part of the site of the Temple at Bubastis, which, having been cleared of the mass of accumulated earth entirely covering it, was explored some few years since, and the results published. At that time it was noticed that a vast number of carved and inscribed stones were lying in one particular spot apart from the Temple proper. These have now been examined, and the results are set forth in the volume before us. One of the plates shows the condition of the fallen remains when cleared of the earth that had covered them for many centuries, and they appear to lie in an almost hopeless mass of confusion, one huge granite block being heaped upon another over the whole area upon which they had fallen. The explorers proceeded to examine each stone separately, many having to be turned over and rolled, after which, paper casts were made of the inscriptions which were found engraved on each. When all had been thus copied an effort was made to put the whole of the subjects together, a work of very great difficulty, increased considerably by the fact that a great many of the blocks were either missing or so thoroughly destroyed that the inscriptions and carvings were obliterated. However, the angles, where they were preserved, served as guides for the arrangement of the subjects, and, judging from the large number of plates, which form a considerable part of the volume,—they are forty in number,—M. Neville has succeeded in reproducing the subjects in a remarkably clear and satisfactory manner.

Much has naturally to be left to conjecture, especially where many of the neighbouring blocks are wanting, but the plates amply show that in the general arrangement of the subjects there is but little in the

restoration before us of the positions of the various groups that is likely to be very far wrong.

The sculptures have adorned the fronts and the sides of a wide gateway, which, facing east, formed the entrance from one hall into another, the size of the latter is supposed to have been about 120 ft. by 80 ft. The drawing of the restoration shows this gateway with a sloping front, the head being formed by a horizontal cornice of the usual quarter-round curve springing from a bead. The excavations of the temple began in the hall, which appears from the inscriptions and the subjects to have been rebuilt by Osorkon II., as the festival-hall of the "Sed Festival," about 950 years B.C. The older building is spoken of by our author as having belonged to the Old Empire. It contained a doorway with an inscription of Pepi I. He believes that it may even have been the sanctuary of the original temple. "If anything of the primitive sanctuary has been preserved, it is in the crypt, hidden under the pavement, on which rest stately columns and majestic arches." The volume is deficient in regard to the total absence of any information on all these most interesting points; in fact, although so much laudable attention has been given to the sculptures, no systematic effort appears to have been made to determine the actual form of the festival-hall or of its architectural design. Indeed, the actual plan even of the gateway itself seems to have been left undetermined, although, from the mass of material which has been found, it seems all but impossible to believe but that its foundations must exist, if not wholly, at least to such an extent as to enable an explorer with some architectural knowledge to determine its actual form. Even its position in relation to the festival-hall is undetermined, and our author offers his readers two conjectural plans. If it were not one, then it would be the other.

The Sed Festival was a very ancient rite it is on record as early as the time of King Pepi, of the sixth dynasty, and at that remote period we already see the king represented with the flail and the crook, like Osorkon, when he is carried in his litter; also, Pepi wears alternately the northern and southern head-dress as it is at Bubastis. The festival was celebrated in honour of Amon, although

he was not the god of the city of Bubastis Amon was the god of the temple under the eighteenth dynasty. He was nearly superseded by Set under Ramesis II., and he is still found occasionally in the sculptures of Osorkon I. with other gods of Egypt; but already under his reign Bast had become more and more the divinity of the place, until, in the time of Osorkon II., she appears everywhere as the divinity of the city, except in the festival-hall itself. But even here Bast is figured on the sculptures. The ceremony, which appears to have had some reference to the Calendar, seems to have taken place at intervals of thirty years, although there are reasons for believing that this period was not always exactly fixed. The elaborate nature of the ritual observed in these celebrations is amply set forth in the plates. The entire surfaces of each of the fronts of the gateway, and also the reveals, to speak architecturally, were covered with rows of minute figures, representing the personages engaged, and these extended from base to summit, commencing from below in each case, and the surfaces were thus a vast granite pictorial record of the event.

One of the inscriptions set forth that the king reconstructed the hall on the occasion of the festival, and it is probable that it was previously in ruins, although Osorkon I. had rebuilt the outer or entrance hall.

The sculptures consist of long lines of processions, preceded by groups of the king making offerings to various divinities whom he had to propitiate before the beginning of the festival. Higher up is the king, followed by his queen, Karoama, standing on a raised platform. On others we see processions of learned men. Here are the magicians; there the stewards; the pages bearing fans; the witnesses; the governors of provinces; and masses of figures which occur again and again through the many plates of the work in endless numbers. Each of the principal figures has his name inscribed in hieroglyphics, and these have been admirably translated. The form of the throne of the king on Plate ii. is curious. Its four sides are shown in four different elevations, the king being shown on the first of these only, the other sides being supposed to face the cardinal points. Plate vii. gives some curious details of various

* "The Festival-hall of Osorkon II. in the Great Temple of Bubastis." By Edmond Neville. London: Hegan Paul, Trench, Trubner, & Co., Ltd. 1922.

divinities, and many of the others contain interesting emblems, while the position of many of the figures, at full length on the ground, denotes "a mark of respect when the king or the shrine of a god is passing. In fact, we see several times that priests are lying down quite flat on the ground, smelling the ground, before the king, as the Egyptian language tersely puts it." Other figures have the fruits of the earth and of the air in their hands as offerings, others again carry the emblems of various provinces, showing that at this great national festival, envoys from all parts of the kingdom were present to take part in the proceedings. Strange as it may appear, considering the nature of the gathering, we have searched in vain through all the plates for representations of instruments of music, and we cannot find any. No rows of harpers, no processions of trumpet blowers. The figures, doubtless, proceeded with vocal music, and with continuous chants, but the absence of instruments is not a little remarkable.

The plates, and the graphic descriptions of them which M. Naville has given in clear and readable letterpress, render this book a very welcome and important addition to Egyptology, and we refer our readers to it with no little gratification. The useful society whose labours have occasioned its production may be congratulated upon this year's work, and the subscribers are doubtless contented that so much has been done with comparatively slender support. The volume, it has to be remembered, is not only a complete treatise upon an interesting event of Egyptian history, but its entire subject-matter has been brought to the light of day by the work of the Egyptian Exploration Fund. Buhastis, by its position, within easy reach of tourists, on landing in Egypt, will always be an interesting place of pilgrimage; but far more may be learned by perusal of the work before us, and of a former volume, relating to the Temple proper, than by visiting the site.

It only remains to add that the onerous task of drawing the plates from the full-sized squeezes has been accomplished by Madame Naville, and that these have been reduced by process to form the many plates of the volume.

THE MARBLES OF SAILLON, SWITZERLAND.



THE marble quarries of Saillon are situated on the right bank of the Rhone, in the Valais, close to the station of Saxon, on the Jura-Simplon railway, and about 940 metres above sea-level, or 430 metres above the river. They are connected with the station by a narrow-gauge funicular railway nearly three-quarters of a mile in length, the incline of which varies between 32 per cent. in the lower parts and 80 per cent. in the upper. The railway is constructed on the Riggenbach system, and the loaded wagons, by their descent from the workings, draw up the empty ones. The steel wire cable used (laid about four months since) has 120 strands, and the speed at which the wagons move does not much exceed 18 in. per second.* Blocks weighing over 8 tons have recently been lowered on this rail. About 100 yards from the bottom of the inclined plane, the sawing and polishing works are situated.

Although the Saillon quarries have been worked for upwards of fifty years, it is only within recent times that they have attracted much attention. At first the workings were restricted to a white marble, and for many years this was the only kind produced. The transport of the blocks must have been a rough and costly affair in those days. But very little interest was taken in the quarries until the discovery of Cipollino marble in them, and the announcement by authoritative architects that the new stone bore a very close resemblance to the famous Cipollino of the Romans. M. Chas. Garnier was amongst the first to recognise the value of the

material, and he used it in the Paris Opera House in two shafts, placed at the right and left of the great staircase door, level with the entrance to the orchestra.* M. E. Viollet-le-Duc, amongst others, reported favourably on the Saillon Cipollino at the Paris Exhibition, 1878. Professor Jaccard† and M. E. Guinand‡ have made Saillon marbles the subject of special study.

The marbles are stated by Professor Renevier to be probably of upper Triassic age, but other geologists prefer to class them as Liassic. The beds have a considerable inclination outwards of about 35 deg., which circumstance much facilitates the operations of quarrying. The following is their order of superposition in the quarries, with the names by which the marbles are known in the market:—

- (Swiss Portor.
- g. Saillon Turquin.
- Saillon Grey.
- f. Yellow Marble.
- e. White
- d. Ribbioned Cipollino.
- c. } Yellowish-grey Marble.
- Black Marble.
- b. Grand Antique Cipollino.
- a. Modern Green.

a. The lowest bed (*Fert. Moderne*) produces a greyish-green marble. When polished vertical to the bedding, the stone presents a light green base, with a number of thin, close, dark-green, and more or less broken lines running through it; a peculiar network pattern results. Sections parallel to the bed, naturally have a very different appearance, the light and dark greens occurring in larger irregular patches shading off into one another, the whole having much analogy with Genoa green. It is a very compact marble, and is obtained in large blocks; the thickness of the bed now worked is about 9 ft.

b. The Grand Antique Cipollino occurs in a bed about one yard in thickness; its ground is a yellowish-white, having green, violet, and dark bluish veins, which present varying patterns according to the relation the polished surface bears to the bedding. It is very fine-grained, is susceptible of taking a high polish, and is one of the most handsome marbles in the market. Its subdued tones form a great relief when contrasted with the flaring, vulgar marbles so commonly used, and which have done more than anything else to bring marble into disrepute for decorative purposes in recent years.

c. The Black marble at the base is slightly argillaceous, dense, and schistose in structure; whilst the upper portion is a yellowish-grey stone. Their total thickness is about 9 ft.; they are of little commercial value, in consequence of frequent cracks and fissures.

d. The Ribbioned Cipollino is distinguished from the Grand Antique by reason of the colours being more accentuated, and it does not present such a rich appearance, though a fine effect is produced when it is made up into columns. The ground of this marble is slightly yellow; its tint has been compared with that of old ivory. The average thickness of the bed is 4 ft.

e. The White marble bed is about 5 ft. thick: it is fine-grained, dense, very homogeneous, slightly translucent, and at first sight is not unlike some varieties of Carrara. It is not saccharoid, however, and its texture is otherwise very different to the well-known Italian marble. The Saillon White is not of much value for statuary, because of the numerous cracks and fissures with which it is permeated.§

f. The Yellow marble has greyish-violet veins, is about 6 ft. in thickness, but large blocks cannot be obtained.

g. The three marbles included in this division are tinted different shades of grey, with yellow or white veins. The upper part is

darker-coloured than the middle and lower. The Saillon Turquin is a handsome stone, its white veins being both sharp and cloudy, presenting in certain sections a very weird appearance.

The structure of the Saillon marbles has been induced by metamorphic action, but there seems to still remain rough indications of their former character in the field, although the alteration has been complete enough to obliterate all traces of fossils. Examined under the microscope, the marbles exhibit a remarkably uniform grain, sprinkled with small fibrous masses of magnesian and ferrous silicates. The magnesian silicates polish with the same facility as the carbonate of lime, of which the stones are almost entirely composed.

Professor L. Tetmajer, of the Swiss Federal Office for the Examination of Building Materials, Zurich, has experimented on the crushing strength of the various Saillon marbles, but we need not give particulars. As might be imagined with such dense materials, they all come out at figures much in excess of anything they would be required to withstand when built up. The weight of a cubic metre of the stone is 2½ tons.

In a report by M. Maurice Lugeon (of the Lausanne University), the MS. of which is before us, the marble beds are stated to be practically inexhaustible. His observations lead him to believe that the following quantities are yet available without altering the machinery as at present disposed:—

	To be quarried—	
	1. In the Open.	2. In Galleries.
	Cubic metres.	Cubic metres.
Modern Green	2 150	1,813
Grand Antique Cipollino	600	410
Ribbioned ditto	320	120
		3,270
		2,343

Speaking of the waste and debris of the quarries, M. Lugeon points out that excellent lime could be manufactured from it, especially from the White beds.

Good examples of the Saillon marbles may be seen, in addition to those at the Opera House mentioned, in the church of St. François Xavier, Boulevard Montparnasse, Paris; Notre Dame de Fourvières, Lyons; and in the Theatre, Geneva. Since its introduction into England it has been used, amongst other places, in the new Greek Church, London; University Examination Schools, Oxford; and we understand that the new pump-room at Clifton will contain twenty columns and twenty-four pilasters, each 15 ft. in height, of Saillon Cipollino marble.

NOTES.



THE annual public exhibition of the students' designs at the Royal Academy took place on Monday last. As far as architecture is concerned, the department to which we are bound to give the first attention, we must say that the results are very poor, and do not go to support the President's felicitation on the quality of the work sent in. The principal subject was a design for "a small country church in a scattered moorland district," for which Mr. Jas. S. Stewart obtained the travelling studentship, and his design was certainly the best, but none of the competitors have in the least grasped the idea of the kind of building which should answer to such a title, nor are the drawings in other respects more than a very ordinary set. The measured drawings of the north porch of St. Paul's, by Mr. R. A. Reid and Mr. Kirby (first and second silver medals) are good and careful pieces of work. But it certainly appears that architecture is in a very languishing state in the Royal Academy, and that it would be almost better to discontinue the profession of the study of this subject if nothing stronger can be elicited than is to be seen this year. In the department of landscape the pictures for the Creswick prize are a very creditable set, and the prize one, by Mr. Siegfried M. Wiens, has fine qualities,

* M. Chas. Garnier, "Monographie de l'Opéra de Paris," fasc. 2, p. 118.

† Jaccard, "Études Industrielles—Le marbre Cipollino antique de Saillon," 1879.

‡ Guinand, "Bull. Soc. Vaudoise des Sciences Naturelles," t. xvi. p. 699 et. seq.

§ M. Triboulet, "Bull. Soc. des Sciences Naturelles de Neuchâtel," t. xii. (1883), separate paper, p. 22.

especially in the clear open-air effect of the middle distance, and is a picture pleasant to look at. The competition for a cartoon of a draped figure (subject, "Mary Magdalen at the Sepulchre") has been won by Mr. Lawrence E. Koe, with a fine drawing of a figure which is both pathetic in feeling and decorative in design; and we may add that there is no other figure in this competition which can pretend to compete with it. The competition for a design for the decoration of a public building has been better contested; the design to which the prize has been awarded, by Miss Beatrice Parsons, is no doubt the best both in the composition and in the design and drawing of the life-size single figure, but there are two or three others of decided merit, Nos. 126 and 124 among them (the names of the prize-winners only are given). The subject of "Astrucan hurled from the battlements of Troy in the presence of Andromache" is rather a violent one for sculpture, which has been treated with a great deal of spirit at least by several competitors, and Mr. D. McGill, in the group to which the prize has been awarded, has contrived to group the figures in a sculptural manner without losing energy of action. In the competition for a "model of a design containing figure and ornament" Mr. C. J. Allen has worked up the well-worn acanthus scroll (Renaissance pattern) into a very pretty decorative composition, but students in this branch should be encouraged to try new materials for their decorative foliage. "The Judgment of Solomon" was the subject for the Armitage prize for a design in monochrome for a picture; a suggestive subject enough; the competitors seem to have been curiously afraid of architectural surroundings to it, for which the situation gives every excuse, and which might have been turned to good account in the design.

THE December number of the *Classical Review* deserves the attention of all those who are interested in the Homeric question, from its archaeological side. Mr. Cecil Smith does good service in his full and clear summary of the controversy as it now stands between Mr. Petrie and Mr. Cecil Torr. This controversy has for months been winding its way through the *Academy*, the *Athenæum*, and the *Times*, and Mr. Smith's summary is put together "in view of its continuance over yet another six months." The evidence on either side is exceedingly complicated, the more so as it is involved in questions of Egyptology, so that Mr. Smith's lucid and unbiassed statement will be specially welcome. The point at issue is, it will be remembered, that Mr. Petrie claims for Egyptian discoveries that they enable us to assign a date of about 1400 B.C. to the Mycæan civilisation, while Mr. Torr argues that this conclusion, be it right or not, is not warranted by the evidence as yet adduced. We may note that the "Homeric" question still further occupies the present number, as Mr. Cecil Torr, in a review of Mr. Leaf's "Companion to the *Iliad*," attacks Mr. Leaf's whole position, and specially his view of the relation of Dorian, Achaean, and Ionian civilisations.

WE referred last week (pages 453-4 ante) to a resolution passed by the Society of Antiquaries in regard to certain restoration work going on at Lichfield. We find the work in question is being carried out under the care of Mr. J. Oldrid Scott; and without undertaking to approve of all he is doing there, we must say that we think it is very unreasoning and uncourteous action on the part of the Society of Antiquaries to pass a resolution condemning the work of an architect who is himself one of their members without (as Mr. Scott assures us) giving him any notice of it or any opportunity of explaining the real facts, with which those who proposed and carried the resolution seem to have been imperfectly acquainted. The following extract from a report by Mr. Scott

on the subject puts a different light on some part at all events of the work:—

"The transepts at Lichfield were built a few years after those at York, and were, to a considerable extent, copied from them, though on a much smaller scale. . . . The transepts were entirely recast in the fifteenth century, the numerous lancet windows being, with the exception of those in the west wall of the south transept, done away with, wide windows with tracery being put in their place. . . .

This work of transformation from an early to a late style was skilfully carried out with the exception of the great window in the north transept, where the wide and low arch of the new window was given a peculiarly ungraceful form, neither four-centered nor elliptical. The ancient arch stones were re-used to form it, and the early jambs with their characteristic dog-tooth ornament were left untouched.

This spreading arch had had the natural effect of exerting a powerful outward thrust on the jambs and side walls, and they had given way to such a serious extent that means were taken some years since by the intervention of a relieving arch and an iron tie, to prevent the injury from going further. This had, however, failed, and the whole of the transept end was in a most precarious and threatening condition.

What tracery this window had when first rebuilt we do not know, as it was destroyed during the siege, and was re-erected by Bishop Hackett in the plain style which economy then necessitated. This tracery, in its turn, had fallen into such a deplorable state of decay that it was in the greatest danger of falling, and some restoration was imperatively called for. To renew such a meagre design seemed hardly desirable; while an attempt to replace it with better tracery, such as must have preceded it, would have been to substitute new work for old without the guidance of any evidence.

A bolder alternative was to reconstruct the Early Lancet windows with the numerous ancient stones which had been preserved in the later arch, and in doing this to remove the danger which has for so many years threatened the transept, and this plan after long deliberation has been adopted, and has lately been brought to a successful completion.

The Early English stones found were so many, and their condition was so perfect, that it has been possible to ascertain with certainty what the original design was in every particular. . . .

So completely it has been possible to reconstruct the lancets that in the five beautiful inner arches there are only twelve new stones; all the others, amounting to some hundreds, being ancient."

Had the old work not been in so dilapidated a state as Mr. Scott describes, it would have been a reasonable question whether it should be disturbed; but under the circumstances, the late work having decayed and so many of the actual stones of the earlier work being in existence, the course pursued by the architect seems perfectly reasonable and logical. Unfortunately, archaeologists are too prone, as in this instance, to condemn the proceedings of architects without waiting to find out the facts.

THE Council of the Surveyors' Institution have been entering into arrangements for admitting to membership surveyors in the Colonies who are not able to attend to pass the usual examination. The change is proposed with a view of federating the profession throughout the empire, and of affirming and defining the professional status of Colonial Surveyors; and the Council of the Institution are prepared to entertain applications for admission to membership, without examination, from surveyors holding official appointments in the following British Colonies and Dependencies, where it is understood that candidates for such appointments are required, as a condition precedent, to pass an examination which can be accepted in lieu of the professional examinations of the Institution. The Colonies to which the arrangement applies, at present, are India, Victoria, New South Wales, Queensland, Western Australia, South Australia, New Zealand, Tasmania, Canada, British Guiana, West Indies, Cape Colony, and the Straits Settlements. A Colonial Surveyor will be considered eligible *ceteris paribus* if he shall have passed an examination qualifying him as an Authorised or Licensed Surveyor, or as an official, or Crown Surveyor, or Surveyor-General, in any of the foregoing Colonies and Dependencies. All Candidates will be required to furnish a detailed description of the Examination or Examinations passed by them in the Colonies,

which must be signed by the candidate, and, in the case of a subordinate officer, countersigned by the Surveyor-General, the Colonial Secretary, or other chief official. The Diploma granted to a Colonial Member will bear upon the face of it a notification that it applies solely to the Colonies, and is in no sense a Diploma available for a Surveyor practising in the United Kingdom.*

THERE have of late been various discussions in the London County Council in regard to taxation of ground rent and kindred subjects. But they have lost all practical value because the decision in respect of all the schemes of the Council in regard to new methods of raising revenue lies with Parliament. We are rapidly nearing the time for the assembling of Parliament, and therefore the debates in the Council have become somewhat academic. The general view of the majority of the Council in regard to new methods of taxation, betterment, taxation of ground-rents, and so forth, is pretty well understood. The point of interest is the attitude which a new Parliament will adopt towards the proposals and desired legislation of the Council. We confess that we think that the House of Commons will take a much more conservative view of the financial proposals of the Council than the Progressive party expect, but a few months will show.

THE discussion in regard to the sanitary condition of the Johanna-street Schools of the London School Board, as reported in the *School Board Chronicle*, terminated with the passing of a resolution that an official inspection of the schools should be made by certain members of the Board, with the assistance of the Medical Officer, and that they should be empowered to close the school if that were deemed necessary, and to report to the Board. This was an amendment to a previous motion to close the schools at once, and was probably the best course to take. The amendment was carried by 38 votes to 6. From the evidence previously given in the Southwark Police-court by Dr. Verdon, it would appear that he, as Medical Officer of Health, had long warned the School Board as to the insanitary state of this school, and had received an admission, in 1891, in a letter from the Board, that they "knew the closets were offensive." In that case they certainly ought not to have waited till now to take the action which they have now tardily decided on. There may be some exaggeration in the outside statements made in regard to the school, but it must have been obvious for a long time past that it was not in a satisfactory condition. The London School Board have also had under discussion the question of throwing open new schools to competition among architects, a course recommended by the Works Committee, and which we should consider advisable, provided always that the buildings should be carried out, and the plans passed, under the advice and authority of the School Board Architect as consulting architect and final authority. Any other course would be to put him in a very unfair position. We observe, however, that the Committee do not recommend a competition for a special school but for a school "capable of being erected on any ordinary site purchased by the Board;" i.e., a stock plan and design to be dropped down wherever wanted. This is perfectly absurd. Every site has its own special peculiarities, for which the building must be specially planned and designed. If the Board follow the recommendation of the Works Committee in this respect they will do a very foolish thing, as they will find out afterwards.

AT this season of the year a good many technical classes under the auspices of the various County Councils are at work.

* Colonial readers can obtain all further information from the Secretary of the Surveyors' Institution, 12, Great George-street, Westminster.

But it is quite clear that a great deal more care and system are required in this matter if it is to be successful, or even to survive. Technical education is a necessity for the country, but it is a business and not a mere amateurish pastime. If it becomes,—as it is becoming,—of this character, it cannot fail to come to an untimely end in rural districts, for the ratepayers will demand that the money allocated to the County Councils for the purpose should be spent in relief of the rates. We have been informed of cases which show a complete inappreciation of the proper methods of technical education,—such as the teaching of chemistry to a purely agricultural audience entirely unable to understand a word of the lecture, which is followed by comic songs and smoking. In other instances technical classes have been attended only by young ladies. No money should be allowed to be spent on any place unless the arrangements have been first submitted to some competent person on behalf of a County Council, who will certify that the arrangements are satisfactory and that the money will be well spent.

A SOMEWHAT confusing Order was issued last week by the Board of Trade with reference to the new railway rates. The revision has occupied a long time, and it would appear that the magnitude of the task has been under-estimated in some quarters; for, in spite of the extended time allowed, some of the companies will not have completed their new books by the end of the year. By the Order alluded to they are allowed two months longer, and are relieved of the necessity of giving notice of additions made to the books during that period, provided that a "general" notice is given by placard and advertisement of any alterations to come into force on January 1. This is on the understanding that rate-books are to be available for inspection at the stations, and that skeleton forms similar to the pages in the rate-books shall be supplied to applicants at a reasonable charge, and also such extracts from the books as may be required. It appears from a letter addressed to the Press by the secretary of the Mansion House Association on Railway Rates that some of the provisions of this Order were adopted on the recommendation of that body, while others were inserted at the suggestion of the Railway Companies' Association. Other suggestions were made which did not find favour with the Board of Trade, and the fact of the Order being in this way the joint production of the Associations, and the Board may perhaps account for its rather obscure wording.

AN old contributor to our columns, who knew St. David's Cathedral in 1844, writes, with reference to our recent illustration of it:—"No one except a person who remembers the dear old Cathedral as it was half a century ago, can well realise the change for the better that has been wrought by the work of conservative restoration which has been effected within the period. In 1844 the interior was covered from end to end by a whitewash of dingy brown, and there was not a bit of colour in the whole building, either on the walls, or the tombs, or in the windows. The greatest credit is due to the present Bishop, along with Sir Gilbert Scott, for rescuing the structure from the ruin to which it was rapidly tending. The first ten pounds expended on its repairs, it may be interesting to learn, were raised at Oxford, being contributed by personal friends of the future Bishop, then Mr. Basil Jones, of Trinity College, and of Mr. E. A. (afterwards Professor, Freeman, who jointly wrote a historical and archeological work on "The Antiquities of St. David's,"—a work now scarce and valuable. The publication of this work gave to the movement an impulse throughout the Principality, which has continued from that day to this. There is a coach or omnibus daily to St. David's from

Haverfordwest, but the distance is sixteen miles, and the road is so bad that the journey occupies between three and four hours! In fact, at his palace at Abergwilly, near Carmarthen, the Bishop is nearer to his seat in the House of Lords than to his seat in his own Cathedral."

IN the Board-room of St. George's, 11, Hanover-square, Vestry Offices, Mount-street, hangs a finely executed plan of the parish, "surveyed and delineated in . . . 1725, by John Mackay, senr., and junr., mathematicians, of Saint James, Westminster." It is drawn to a scale of 10 poles in an inch, upon sheets of vellum, and has been recently restored. In the lower left-hand corner (east) is set out the Lord Salisbury's property, watered by affluents of the Aye brook, which the State bought in 1799, and for, it is said, 12,000*l.*, from James, seventh Earl and first Marquess of Salisbury, for the erection thereon of a "Penitentiary House for London and Middlesex," which, in 1843, by statute, was re-named Millbank Prison. Since some misconception seems to prevail as to the author of its design, we may here state that eighty years ago the Government awarded premiums of 200*l.*, 100*l.*, and 50*l.* to Mr. Williams, teacher of military drawing at the Military College, Mr. C. A. Bushy, and Mr. Hervey, respectively, for their designs. On March 7, 1868, we published a letter written by a correspondent who stated that the entire fabric,—excepting the gateway, designed by Thomas Hardwick,—was built after Williams's drawings, in the making of which our correspondent helped him. The late George Godwin ascertained, further, from credible sources, that in or about 1816 Sir Robert Smirke, R.A., was deputed to make good the failing foundations of the gateway and other portions of the prison. This he did by laying down concrete. In the end Smirke rebuilt the six radiating pentagonal blocks. Hence, having regard also to the nature of the soil, it is likely, as is said, that the prison cost nearly half a million sterling. It is often stated that to Jeremy Bentham that particular feature of the plan is due: it has been claimed for his brother, Sir Samuel Bentham, by Sir Samuel's widow in letters addressed to and printed in this journal. Nearly two years ago the Secretary of State offered to sell eight acres of the ground to the London County Council for 40,000*l.*, for the building of artisans' dwellings. At the north-eastern corner, by Grosvenor-wharf, of the marshy ground which forms the prison-site stood Peterborough, afterwards Grosvenor House, built by John, Lord Mordaunt, advanced Earl of Peterborough in 1628. That house subsequently became part of the rich heritage of Sir Richard Grosvenor, Bart., as eldest son of Sir Thomas, who married Mary, only daughter and heir of Alexander Davis, of Ebury. The plan of 1725, and one of Ebury lordship, by Henry Morgan, 1675, in the Grace collection, go to show that Pennant does not quite correctly describe Peterborough House as being the "last dwelling in Westminster." A view of it is contained in the "Crowle" Pennant, British Museum. The house was rebuilt by one of the Grosvenors, and pulled down in 1809.

IT is proposed (as will be seen from our advertisement columns) to raise a memorial at Louth to the late Mr. James Fowler, towards which the Vicar of St. Michael's, Louth, hopes that some of the late architect's numerous friends in the profession may be willing to subscribe. It is suggested that a suitable form of memorial would be a screen in the church of St. Michael, a church built by him, and that the design should be entrusted to his son, Mr. Reginald Fowler. Subscriptions can be sent to "The Rev. E. L. Gardner, Louth, Lincolnshire."

THE collection of water-colour drawings by Mr. Arthur Severn, on view at the Society of Fine Arts, is a remarkable one in

its way, but many of the drawings impress us rather too much as attempts to paint special effects of light which have not altogether succeeded. We hardly understand what is the intended effect of "Barges, Coal Strike" (5) where the decks, tops of bulwarks, and cargo of the coal barges all show with a pale light, under a strong sunset light; the effect seems entirely unreal. A want of atmospheric effect in the skies is also to be felt; "Sunset over Coniston Old Man" (8) suggests a conflagration; "Storm Cloud passing over Coniston Water" (17) is a grand little picture; and clouds under certain conditions of atmosphere do assume an almost crag-like solidity, but surely it is a little overdone here. Among the finest things are "Gloomy Sunset, over Skye" (13); "Mussel Gatherers hurrying from the Tide, Morecombe Bay" (57) (in both these the sky seems rather too solid); "Moonlight Clouds, Hawkhead" (65), a very remarkable study of effect, and "Waves breaking by Moonlight" (76), still finer, one of the most real pieces of moonlight effect we have ever seen. The violent swirl of the brown water in "Spate in Glen Cannich" (80) is powerfully given, and "Dead Calm" (87) is a beautiful little sea study.

THE water-colour drawings by Mr. H. B. Brabazon, now on view at the Goupil Gallery in New Bond-street, are mostly mere sketches, in some cases very rough sketches; but they show a very remarkable perception of colour and effect, and are the work of an artist of independent genius. We object, certainly, to any pretence of representing important architectural monuments with such an utter absence of any indication of detail as is the case with some of these; one or two sketches called "The Taj," for instance, are no more than ghosts of the celebrated building, without an indication of its architectural character except in outline or mass, and even that is not correctly given. But some of the sketches in which cities are treated more *en masse*, as "Venice, early Morning" (7), "A Canal, Venice" (17), "Venice, a Dull Day in October" (61), are beautiful in colour and atmosphere. Among the more powerful sketches without distance may be named "A Campo in Venice" (24); "Grand Canal, Venice, after a Storm" (27), and "A Palace on a Side Canal at Sunset" (46); the latter is a splendid piece of broadly treated effect. All who are interested in water-colour art should see these drawings.

WE congratulate the Royal Academy on having elected Mr. Alfred Gilbert a full R.A.

PRIVATE BILLS, AND PROVISIONAL ORDERS: SESSION OF 1893.

WE give below a summary of the more important of the measures for which application will be made by the customary deposit of printed Bills and schemes, with plans and maps, before the close of this month. It will be noticed that proposals for new railways, in London and the provinces, are few, whilst electric-lighting projects are less numerous.

London County Council.—The Council apply for five Bills: in respect of open spaces; the removal of gates, bars, and similar obstructions; an owners' improvement rate or charge; local improvements; and general powers. The bars, gates, and posts stand in eighteen parishes, and are sixty-nine in number. They include those in Lowndes-square and Cadogan-place; Warwick-place, Bedford-row, and Featherstone-buildings; Highbury-grange, Aberden-park and road, and St. John's-park, Upper Holloway; Norfolk (2) and Kensington Gardens squares, Stanhope-street, and Craven Hill-gardens; Eaton-square (4), Belgrave-road (2), Eaton-terrace, Pont-street, and Wilton-place; Harewood-place, Oxford-street; Vigo-street; Harley-street, Devonshire-place, and Park-crescent (2)—Marylebone-road ends; St. Paul's-road (2), Oakley (2) and Harrington squares, St. Pancras; Tavton, Endeleigh, Doughty, Arthur, Heathcote, and Frederick streets, St. Pancras; and Princes-gardens and

Little George-street, Westminster. The local improvements comprise the new street ("Council-broadway") from High Holborn to the Strand; the rebuilding of Vauxhall Bridge, with new approaches, and construction of a temporary wooden bridge at Millbank; a southern approach to Tower Bridge; the new ferry between Kitchin and Rotherhithe; a widening of Wood Lane (south end), Uxbridge-road, and of the southern approach to Woolwich ferry. Open spaces: for acquiring Hackney Marshes, between Hackney Cut and the river Lea, including "Bully Fen," between Temple Mills stream and the (old) river Lea; some land between "Fernside" and "Kirkstall Lodge," Tulse Hill, to make an additional entrance into Brockwell Park; the Albert Palace, Battersea, with all the buildings and ground, as a place of public recreation and resort; Hilly Fields, Brockley which they propose to take over from the Corporation and the Bridge House Estates Committee for a nominal, or other, consideration; York Water-gate, and for adding to the Embankment garden the strip of land behind the gate (formerly known as Villiers-walk); and Lincoln's Inn Fields, about seven acres, now belonging, reputedly, to the Benchers of the Inn, or their lessees; and for repeal of 8 Geo. II. c. 26, which enabled the proprietors and inhabitants of houses in the Fields to levy a rate upon themselves for enclosing, cleaning, and adorning the said Fields. Also, for conferring powers on Vestries and District Boards to erect buildings of various kinds on open spaces belonging to them or under their control. The Council's Improvement Rate or Charge Bill provides for imposing a new rate or charge on lands or property, or its owners, the proceeds to be applied in aid of the cost of improvements and works of public utility. The rate or charge will be collected wholly or in part from occupiers or in such other manner, and not beyond such limit, as the Bill may define. General Powers: this Bill relates to the election of members to represent the Council upon the Thames Conservancy Board, and of additional members (of the Council) upon the Lea Conservancy Board; licenses for the erection of dwelling-houses in districts lying below the high-water line, or subject to tidal floods; the electric lighting of Waterloo and Westminster Bridges, and Victoria Embankment; the alteration of the London Sky-Signs Act, 1891, and the extension of its scope to other structures and erections over, or attached to, buildings, or placed on Sands; penalties and punishment for giving false alarms of fire to the fire brigade stations; a re-arrangement of wards or sub-divisions of parishes and districts in the county of London, other than those dealt with by the City Parochial Charities Act, 1883, with powers to frame and conduct schemes relating thereto; and for powers to compensate any persons who may be injured by working under the compressed air system in the Blackwall Tunnels, or their wives and children.

London and Suburbs: Communication and Conveyance.—By the Great Eastern Railway Company for a line from High-street, Stratford, to their Colchester main-line by the Padding Mill river bridge; and one from Leyes-road to the Gas-light and Coke Company's Beckton Railway; the enlargement of the Liverpool-street station hotel; and the acquisition of numerous parcels of land. Metropolitan District Railway:—To abandon the West Brompton Junction line, as authorised by their Act of 1881; and for extension of time to complete the Acton Junction Railway (1878). Clapham Junction and Paddington Railway:—For an underground railway and subway from Clapham Junction to Bishop's-road, Paddington, with a branch subway from the Royal Albert Hall to Exhibition-road; on a 4 ft. 8½ in. gauge, and with cable or electrical motive power. The City and South London and London and Blackwall Railway Companies ask for an extension of the time and powers now limited by their Acts of 1890, and 1885 and 1889, respectively; so also the Harrow and Paddington Tramway Company, in respect of their Act obtained last year. The Edgware-road and Victoria Railway: for an underground line from the high-road, Kilburn, to Vauxhall Bridge-road, the motive power to be cable traction, electricity, or any power other than that of steam locomotives. West

Metropolitan Tramways Company: a Bill for further powers, and to work by animal, cable, steam, electrical, mechanical, or other power, over their lines in Chiswick, Hammersmith, and Acton. The Metropolitan Outer Circle Railway desire to abandon all further action under the Act of 1888, and to obtain an extension of time under the Act of 1891,—see the *London Gazette* of November 22 and 25 last. Lea Conservancy: For improving and rendering navigable the (old) River Lea, and the Waterworks, City Mills, and Padding Mills rivers. The Board of Trade have approved the Council's resolution to acquire the tramways authorised by the North Metropolitan Tramways Act, 1871.

Electric Lighting.—The Kensington and Knightsbridge Electric Lighting Company promote a Bill for confirming an agreement made with the Chelsea Electricity Supply Company (1889), whereby the latter's undertaking is transferred to the former company. Application will be made to the Board of Trade for provisional orders, subject to confirmation by Parliament, under the Electric Lighting Acts of 1882 and 1888, by the Islington Vestry, and the Poplar and Hackney District Boards in respect of the storing and sale of electricity, the mains to be laid along High and Upper streets, Islington, Holloway and Seven Sisters roads, Kingsland and Stoke Newington High-streets, Stoke Newington-road, Mare-street, and Dalston-lane; and along East India Dock-road, High-street, Poplar, and Bow, Coborn, Tredegar and Fairfield roads. Also by the Holloway Electricity Supply Company, to supply electricity to the northern parts of St. Mary, Islington, parish; the Hammersmith Vestry for the lighting of the parish; and by the Urban Sanitary Authority, Beckenham, for a like purpose.

Miscellaneous.—Paddington Recreation Ground: for purchase and transfer to the Vestry of the ground bounded by Carlton-road (north), Elgin-avenue (south), Portdown-road (east), and Shirland and Kilburn Park roads (west), and to provide for contribution by the vestries of Paddington, St. John, Hampstead, and St. Marylebone, the Willesden Local Board, the Ecclesiastical Commissioners, and the Paddington Estate trustees. This ground extends over 20½ acres, and forms part of the land that was acquired ten years ago, and has been used for five years past as a cricket and children's playground. It is stated that of the purchase-money, 50,880*l.*, a balance of 1,500*l.* remains to be raised, and must be forthcoming before the end of the current year. Conditionally upon this, the London Parochial Charities trustees will add 1,000*l.* to their existing promise to give 1,000*l.** A Sewage Board for Staines and Chertsey ask to construct filtration and precipitation works, for prevention of sewage discharge into the Thames, and to take lands at Walton and East Molesey.

Hornsey Local Board.—For further and better provision as to drainages, flooding, nuisances, infectious diseases, and other sanitary matters; also for regulating the erection and maintenance of sky-signs, and compelling the taking down and removal thereof, and for the licensing thereof, and in respect of street-hoardings and advertisements.

Post Office.—The Postmaster-General seeks for powers to acquire sites for the postal service on the east side of Young-street, Kensington; Boyay-place, Holloway (extension of the telegraphical instrument factory); and Carter-lane and Bell-yard, by St. Paul's (extension of the Savings Bank, new buildings).

West Ham.—The Corporation ask for a variety of general purposes relating to municipal improvements, and the establishment of a Technical Institute, a Free Library, and a local museum.

St. George-the-Martyr, Southmark.—The Vestry promote a Bill to repeal 47 Geo. III. c. 132, and 50 Geo. III. c. 45, to abolish the rector's rate thereunder, and to obtain powers for providing a fund out of the general rate instead. The making of the rector's rate has occasioned considerable dissension in the parish, and particularly in March last, when several members of the Vestry declined to vote.

Crown Lands.—For altering 10 Geo. IV. c. 50, and certain other Acts, to enable the Commissioners of Woods to grant leases of parts of the royal forests for the making of roads,

tramways, allotment gardens, recreation grounds, water, drainages, lighting, or similar works; and for transfer to the Ecclesiastical Commissioners of the trusts now held by the Archbishop of York and the Commissioners of Woods in England to Sunk Island (river Humber), and Portland, Oxford, and Welbeck chapels (St. Marylebone).*

The Provinces: Communication and Conveyance.—Dover Undercliff Reclamation: a Bill for a seaside drive and walk between East Cliff-terrace, Dover, and Ness-point, St. Margaret-at-Cliffe. The road will be nearly four miles long, and the works are estimated to cost 200,000*l.*† Birmingham, Kidderminster, and Stourport Railway Company: for new lines in the counties of Worcester, Stafford, and Warwick. A sea-shore electric-railway from Brighton to Rottingdean. Hunslet Railway Company: new lines in Yorkshire, West Riding. North-Eastern Railway Company: for amalgamation with the Hull Docks Company, and incorporation of the Dock proprietors with the Railway Company. Great Eastern Railway Company: A line from Barnwell, Cambridge, to Cherry Hinton, to connect their Newmarket branch and Cambridge and Ely main lines, and taking part of Coldham Common, Barnwell; and an extension of the trowse-basin and fish-market, with a new harbour swing-bridge at Lowestoft. Midland and Great Northern Railway Companies: For taking over the whole undertaking, works, plant, rolling-stock, &c., of the Eastern and Midland Railway Company, known as the Mundesley Branch, with which the Great Eastern Company propose to make a junction from Walsham on their East Norfolk line. We may here mention that the Midland Company are building a new bridge over the Onse, and when that is ready will begin a new station at Bedford. Other works in hand will provide for separate goods and passenger lines between Leicester and London. London and South-Western Railway Company: A Bill for constructing a graving dock at Southampton adjoining the Empress Dock, and a quay, about 1,200 yards long, alongside the rivers Itchen and Test. The Bill provides for a further widening of the lines running into Waterloo terminus, and a large number of minor projects, affecting, for the most part, the purchase of parcels of land. Lancashire, Derbyshire, and East Coast Railway: For certain deviations from various lines authorised by their Act of last year, and the straightening or deviation of the river Rother for about 250 yards in Killamash and Brighton parishes, Derbyshire. Abandoned: Brighton, Rottingdean, and Newhaven Direct Railway Acts, 1886-7; Towcester and Buckingham Act, 1889; and South Hampshire Railway and Pier, Dover and Calais Submarine Tubular Railway, for laying two or more tubes from Abbot's Cliff to Sandstone Cliff, one mile south of Caps Griz-Nex. For Bills to enable the Manchester Ship Canal Company to raise more capital, and the Corporations of Manchester, Salford, and Oldham to lend to the Company, upon debentures or other securities.

Electric Lighting.—Application to the Board of Trade for provisional orders is made by the British Electric Light Company to supply electricity to Newmarket; the Reading Electric Supply Company to supply electrical energy throughout the Borough; Eccles and Colchester Corporations to make, store, and sell electricity in their respective areas; the Manchester Edison-Swan Company to supply Altrincham and Bowdon districts; and so similarly by the Bridgeton Local Board, and the Newcastle-on-Tyne Electric Supply Company. Brighton and Hove Electric Light Company, a bill to make and supply electricity to Brighton and Preston.

Water Supply.—Bills for extension of area, and new works at Devonport, East Stonehouse, Plymouth (by the Corporation), Bodmin, Poole, and Bilsiton (by the Commissioners). The Chatham Corporation desire to take over the Brompton, Chatham, Gillingham, and Rochester Waterworks; the Frimley and Farnborough district wish for powers to supply water to Farnborough, Crondall, Yateley, Frimley, and

* Three or four months ago, 15,000*l.* was contributed by St. Pancras Vestry (5,000*l.*) and the County Council (10,000*l.*) for the roadway, with its gate, belonging to University College, at the northern end of Gower-street.

* The Vestry announce that they will deposit this Bill only if 700*l.* of the balance be assured by the 25th inst.

† A contract of 415,000*l.* has just been made for the first portion of the new harbour; the South-Eastern Railway are about to take a large site at the town's west end for their new terminus; and the Corporation will spend about 50,000*l.* on street improvements.

Ash; the West Hampshire Water Company, to supply Christchurch, Sopley, Ringwood, Milford, Holdenhurst, Brockenhurst, and Lyndhurst.

Harbours, Ports, &c.—A Bill for a pier and jetty, 7,790 ft. long, at Weston-super-Mare, opposite the end of Regent-street. Provisional Orders, by the Deal Harbour Board Company, for a tidal harbour at Deal (situated at the north end of the town, between the Coastguard Barracks and the ruins of Sandown Castle), having two piers, 700 ft. long and 500 ft. apart at their shore ends; a pier-jetty and landing-place at South-wold, opposite South-green; a pier at Garth-point, Bangor; and the lengthening by 200 yards of Sandown pier, I. of W., and to render it available for passengers, cattle, goods, and merchandise. Fishguard Bay Railway and Pier Company, a pier or breakwater, 350 yards long, with a sea-wall, at Llanwnds, Pembrokeshire. For two piers at Morecambe, one (1,403 yards) from the end of Regent-street, the other (850 yards) opposite Alexandra-road; and one at Tenby, from White Sandgate, opposite St. Catherine's-terrace.

Municipal.—Bristol Corporation: new docks and other works at Avonmouth; new streets in the parish of St. Augustine-the-Less, and the widening of College-green (south side) for the whole length of the parish churchyard. For local, sanitary, and other improvements at Salford, Harrogate, Liverpool (including sky-signs), York; Wigan, Blackpool, and Bolton (including tramways), and St. Helen's: Manchester, a provisional order for tramways in Manchester and Cheetham townships; Rochester, to take over the local waterworks, and to extend the borough limits to include Strood, Frindsbury, and St. Margaret's; Sheffield, to widen High-street and Market-place between Fargate and Change-alley, and Fruit-market between Change-alley and Fitzalan-square; and for provisional orders for tramways at Plymouth, Great Yarmouth, and Hull.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

Evidence of Mr. Deacon, C.E., on the Thames Conservancy Reservoirs Scheme.

AMONG the witnesses examined at one of the last sittings of the Commission was Mr. Geo. Fredk. Deacon, C.E., Consulting Engineer to the Corporation of Liverpool, for whom he projected and carried out the Vyrnwy waterworks in North Wales which supply that city. It had been referred to him, he said, by the London County Council to report upon the nine reservoirs on the upper tributaries of the Thames, suggested on behalf of the Thames Conservancy, either to supply London direct or to feed the river in the summer months. He had examined the ground, and made himself familiar with it.

The most marked peculiarity of the tributaries, Mr. Deacon said, is the smallness of the summer flow in relation to the rainfall. That arises, in most cases, from the very jointed nature of the rocks. Much of the water escapes, and is caught in the streams at lower points, or finds its way into the Thames. From gaugings, he is satisfied that the loss of rainfall will be much larger than has been estimated, and that during the summer there would be great loss from the reservoirs by evaporation. The reservoirs could be made, except, perhaps, that of the Sherborne, which would require a puddle wall all round. But waterworks reservoirs ought to be twice or thrice the depth that these would be, and have much steeper sides. The water would grow an immense amount of vegetation, which would make it, not worse for the Thames, but undesirable for direct supply. The Windrush might be made watertight, but not the Cherwell; the Sor Brook would be fairly satisfactory, but the Marlstone would be within the reservoir; the Swere would be exceedingly doubtful without a puddle trench all round it; Nether Worton or Deddington is like Sor Brook; in the case of the Dorne, being on the oolites, water would not run out so rapidly as through marlstone, but it would not be watertight; and it is much the same with the Glyme; but the Thames on the Kimmeridge clay is much better, although it would be a shallow, flat reservoir. In all cases there are small villages draining into the

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 425, 456, 480, 508; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 209, 316, 338, 353, 375, 396, 428.

streams. Still, after examining a number of streams he concluded that Messrs. Marten & Hefe had found the best places. But the reservoirs would not do the work it was proposed to put on them. Artificial reservoirs like those at Staines (proposed by the companies) would keep the water in a better condition. For details Mr. Deacon referred to statements he had handed in.

In one statement, Mr. Deacon said that the Vyrnwy scheme was the outcome of several projects which, at the instance of the Corporation of Liverpool, he investigated about the year 1876. He has been largely consulted in connexion with the water supply of other places. He has made a special study of the flow of water from the ground in relation to the rainfall, and for many years has been in the habit of gauging streams and comparing those gaugings with the respective rainfalls on the areas they drain. In the case of the River Vyrnwy, such gaugings have been carried on almost continuously for a period of fourteen years; and, in the case of the River Severn at Worcester, for a period of twelve years. For the purposes of the present inquiry he has made an examination of the Thames basin, or rather, of such parts of it as were in the least likely to be suitable for the formation of reservoirs for the collection of potable water. The configuration of the surface of the ground over the north-west portion of the Thames basin is in some places such that, where the geological formation would ensure watertightness, it would be possible to construct certain reservoirs, each of considerable area, but not of considerable depth in relation to that area. But pervious and impervious strata are so mixed up throughout the district in question that there is in most cases considerable doubt:—1st. As to the watertightness of the formations which would be covered by the water of each reservoir. 2nd. As to the condition of the rocks beneath the area from which each reservoir would receive its supply, and, therefore, as to the proportion of the otherwise available rainfall which would pass through the strata without entering the reservoir.

On commencing inquiry at the instance of the London County Council as to the existence of sites for large reservoirs on the tributaries of the Upper Thames, Mr. Deacon at first confined his attention to the contour of the ground, and to the probable condition of the bottom of each supposed reservoir site. He did not expect to find the abnormal relation between the rainfall and flow of the ground apparent at once without exact gaugings. In the course of the investigation, however, he was so struck by the obvious smallness of the flow of most of the streams in relation to the rainfall, that he subsequently made arrangements for gauging a number of them. In all, about forty-five gaugings have been made and compared with the rainfall; but a number of the areas so tested have proved to be entirely unsuitable for reservoir construction. The least objectionable sites are to be found among the nine which have been laid before the Commission on behalf of the Conservators.

Mr. Deacon at first believed, but afterwards doubted, that the reservoir on the Thame at Hardwick would yield about the estimated quantity; and the yield of the others is exceedingly doubtful. The proportion of the rainfall which could be rendered available, even if the other reservoirs were made watertight, is abnormally small, and its actual value can only be ascertained by continuous gauging of the streams. The suggested reservoirs are all shallow. From their large areas the evaporation would be considerable, and this loss, considered in conjunction with the insignificant summer flow towards most of them, would render it necessary to provide a larger number of days' storage than would otherwise be required. The reservoirs drain much arable land, and the populations grouped in villages above some of the sites are considerable. They are not situated at sufficient elevations to supply the Metropolis without pumping. He is of opinion that reservoirs upon these, or upon other sites in the Thames Valley, will never prove satisfactory sources of supply for the Metropolis.

Abnormal Relations between River Flow and Rainfall.

In a supplemental statement embodying statistical and other details, Mr. Deacon says that he has analysed certain rainfalls and dis-

charges, which, in his belief, have an important bearing upon the suitability or otherwise of the upper valleys of the Thames for the collection and storage of water. His statement is accompanied by four tables, which may be described:—

Table A gives the discharge in percentages of one cubic foot per second per 1,000 acres on certain days from the areas suggested on behalf of the Conservators as suitable for the construction of reservoirs; the accumulated rainfall during one, two, three, four, five, and six previous days respectively, and the accumulated rainfall during one, two, three, and four previous weeks respectively. Table B gives the corresponding results for several other Thames tributaries not suggested as sites for reservoirs. Table C gives for a normal drainage area in North Wales a number of examples of discharge selected as having followed upon rainfalls corresponding fairly with the rainfalls in Tables A and B. Table D gives the maximum and minimum rainfalls, discharges and losses, in periods of twelve months, on the basin of the Thames down to Teddington, and on the basin of the Severn down to Worcester.

The most remarkable feature of the various summer gaugings of discharge of the upper Thames tributaries is their small volume, and the great uncertainty of that volume in relation to the rainfall, which renders it impossible to predict its amount, even within wide limits. The uncertainty applies equally to the areas in Table A, upon which it has been proposed to place reservoirs, and to those in Table B, with respect to which no such suggestion has been made. *Ceteris paribus*, the larger the area the less will be the intensity of the flow off the ground per unit of area following upon any given summer rainfall considered in detail, and this must be borne in mind in making any comparison between the discharge from the tributaries within a limited period, and that, for example, of the Thames at Teddington.

Table C is prepared for the sake of comparison with Tables A and B. The drainage area to which it relates is 18,000 acres and discharges into the River Vyrnwy in North Wales. It does not differ widely in extent from many of those on the Thames tributaries, in Tables A and B. If the geological formations were the same, a given rainfall would not reach the point of gauging more quickly in the case of the Vyrnwy than in the average of the Thames cases. The Vyrnwy drainage area consists chiefly of the clay, slates, shales, and grits of the Upper and Lower Silurian formations. The yield of this district in relation to summer rainfall is not exceptional. It is about the same as is generally found in districts suitable for the construction and working of impounding reservoirs, and has only been chosen for the present comparison because it is in this respect a normal area, and because it is the only area of dimensions approximately similar to the areas on the Thames tributaries under consideration which Mr. Deacon has continuously gauged for a sufficient number of years to afford the necessary examples of approximately equivalent rainfall over similar periods.

A glance is sufficient to show that, with the exception of the Windrush, the discharges from springs and summer rainfall on the Thames tributaries, upon which reservoirs have been suggested, are all very much smaller than those of a normal district such as the Vyrnwy. At the time of gauging, the discharge of the Sherborne Brook was less than the one-hundred-and-fiftieth; the discharges of the Rivers Glyme and Dorne and the Sor Brook were from one-half to one-third; the discharges of the River Swere and the Nether Worton river were from one-sixth to one-ninth; that of the Cherwell streams from one-ninth to one-twelfth; and that of the River Thame from one-sixteenth to one-twenty-fifth of the discharge which would have resulted from the same rainfall per unit of area in a normal district.

The Windrush gave a discharge of 62 per cent. of one cubic foot per second per 1,000 acres, which, though small for the rainfall, was about twice as great per unit of area as in any of the other eight cases. The area to the point of gauging, viz., the south-west corner of Barrington Park, is 59,390 acres, or more than double any of the others. The river at this point flows over the Upper Lias Clay, and while traversing the Lower Lias Clay above, and the Marlstone between that and the Lower Lias Clay, it receives the springs from the jointed Marlstone, the Midford Sand, and from some Oolites.

During the four weeks preceding the various Thames gaugings in Tables A and B, the rainfall, as also recorded in those Tables, was from 1.53 in. in the case of the River Churn at Bannton, to 2.53 in. in the case of the River Glyme, hut, omitting the Windrush, the resultant discharges given in percentages of a cubic foot per second per 1,000 acres were only:

From the Glyme	32 per cent.
" Borna	30 "
" Sor Brook	23 "
" Swere and Nether Worton rivers, under	12 "
" river Cherwell and its tributary, about	7 "
and " Sherborne stream, under	4 "

It is shown by Table C that a corresponding normal area after corresponding rainfall will discharge from 80 to 150 per cent.

And will very rarely (after a corresponding rainfall) fall to ... 43 or 52 per cent.

In gauging various normal streams in the very dry years of 1878, 1884, and 1887, the lowest results obtained from areas exceeding 1,000 acres were as follows:—

The discharge of the river Wyrow (18,000 acres) fell, on August 3, 1876, to	21 per cent.
" On June 27, 1884, to	21 "
And on July 23, 1887, to	22 "
The discharge from the river Coway (North Wales), 2,669 acres, fell, on June 20, 1884, to	25 "
The discharge from the river Marchant (North Wales), 1,561 acres, fell, on June 23, 1884, to	24 "

Gaugings on other normal streams in different parts of the country, having drainage areas exceeding 1,000 acres each, have given discharges towards the ends of long droughts varying from 28 per cent. to 33 per cent. of one cubic foot per second per 1,000 acres; and on an area of only 761 acres on the clay slate of the Lower Silurian rocks, after a rainfall during the previous four weeks of 2.5 in., Mr. Deacon found the stream to be discharging only 17 of a cubic foot per second per 1,000 acres.

The gaugings of the Thames tributaries, with one exception, began on the 1st and ended on the 12th July, 1892. The mean discharge at Teddington, including water pumped by the London Companies, was, towards the end of that period, about 35 per cent. of a cubic foot per second per 1,000 acres, which may be taken to be the discharge per unit of area of the 2,353,000 acres of the Thames basin corresponding with the discharges of the upper tributaries given in Tables A and B. For a corresponding rainfall on the Severn basin of 1,256,000 acres above Worcester, the discharge would not be less than 35, and would probably exceed 60 per cent. of a cubic foot per second per 1,000 acres.

The rainfall of three consecutive dry years in this country occasionally falls to about 78 per cent. of the mean, and the rainfall of a single year falls below 67 per cent. of the mean. On such areas as those of the Upper Thames tributaries, it is exceedingly difficult to predict the proportion of this reduced rainfall that will enter a reservoir.

If from the main rainfall of 27 in.,—which is probably correct,—we deduct one-fifth, the net result, which will exceed the mean discharge of three dry years, is only 21.6, almost identical with 21.62 in., the rainfall over the whole Thames basin in the dry period from July 1, 1889, to June 30, 1891. The loss in that period as shown by the difference between the rainfall and the Teddington gaugings added to the water abstracted by the London Companies, was 17.22 in., and if the loss proved to be as much as this upon the Thames area, the available rain for a reservoir capable of equalising the flow of three dry years would be under 4 in. The other cases proposed are so abnormal that without continuous gaugings it is impossible,—even assuming the reservoirs to be watertight,—to assign to each the amount of inevitable loss in dry seasons. The Thame and Windrush reservoirs might probably, without much difficulty, be made watertight, but it is exceedingly doubtful whether, by any such works as have been suggested, or are desirable, the remaining sites could be rendered watertight. Under such circumstances, if Mr. Deacon were called upon to assign to the suggested reservoirs a probable minimum annual yield, it would be considerably less than that given in the statements submitted to this



Sketch for Panel in Wood or Metal Work. By Miss E. M. Rope.

Commission on behalf of the Conservators. If it is thought worth while to consider this matter further, the proper course is to gauge the streams at the points of proposed interception, and this should be done with automatic recorders. It is not necessary that these gaugings should extend over any exceptionally dry years, as the ratio of the mean annual rainfalls is already determined sufficiently by Mr. Symons' gauges; but the proportion lost has not yet been determined for any such areas as those of the tributaries of the Upper Thames.

Flow of the River Thames.

Mr. A. R. Binnie, the Chief Engineer to the London County Council, submitted a voluminous statement and elaborate tables on this subject. In his introduction he said:—

"In consequence of certain returns of the daily flow of the river at Teddington Weir and other information having recently been made public, it has become possible for the first time to arrive at some general and accurate conclusions on the subject in a way which hitherto has been impracticable.

The Thames, in many respects, differs from most of the other large rivers of the United Kingdom, among the principal of which are the gentle slopes of its valley which up to the line of watershed are thickly inhabited and cultivated in all directions, and the fact that the streams which feed it in nearly all cases take their rise among the porous strata of the chalk and oolites.

There has arisen an impression that the flow of the river is more uniform than in other cases, on account of the autumn and winter rain being stored up in what some persons call 'vast underground reservoirs,' in other words, in the fissures and pores of the permeable rocks among which it takes its rise.

Consequently, it has been assumed that a much larger proportion of the total rainfall is discharged than is found to be the case in other rivers and also that the capacity of impounding reservoirs, if constructed, need not be so great to utilise and equalise the varying flow of the river.

No doubt, owing to the fact that the river has been rendered navigable by the construction of locks and weirs cutting its length up into long stretches or pools of permanently level water, the actual facts of the case have been to a certain extent veiled from immediate and *prima facie* observation; although in the extremely dry and waterless condition to which the large areas of the Oolitic plateaux, in the upper valley, and the chalk downs are reduced in summer, and in the winter floods of the river at and about Oxford, which receives its flow principally from the Oolites and chalk, we have had indications that those strata are not quite so porous, and do not retain the rainfall which they do absorb for so long a period as some persons would at first sight imagine.

The facts which have within the last few months become available for the purpose of studying this question are the following:—

1. The daily flow of the Thames at Teddington Weir, from January 1, 1883, to December 31, 1891, as furnished by the Thames Conservators to the Royal Commissioners on June 14, 1892.
2. The average quantity of water per day and per month abstracted by the five companies from the River Thames at Hampton, Molesley, &c., above Teddington during the same period, as derived from the Water Examiner's Returns.
3. The monthly and annual average rainfall of the Thames Valley, furnished to the Council by Mr. G. J. Symons, F.R.S., during the same period.
4. The average sunshine, temperature, and

humidity of the air, as derived from the Observatories of Greenwich and Oxford during the same period.

The Thames Conservators have also placed before the Royal Commissioners on July 26, 1892, a diagram comparing the volume of the discharge with the rainfall; but as the discharge on this diagram is given in million gallons, and the rainfall in inches, it does not lend itself very readily to the elucidation of the important subject under enquiry, as there is no immediate and direct mode of comparing inches of rainfall and millions of gallons when plotted to different scales on the same diagram.

The Thames Conservators also, through their Engineer, Mr. J. C. More, placed before the Royal Commissioners on June 14, 1892, a table showing the annual volume of discharge at Teddington Weir, from 1883 to 1891 inclusive, with the addition of the quantities abstracted by the Water Companies. In this table one is at once struck by the fact that in 1889 out of a total average rainfall of 25.64 in., 10.4 in. are said to have been discharged from the ground, whereas in 1886, with a total average rainfall of 31.07, the discharges from the ground is said also to have been 10.5 in. but a reference to the detailed table of the daily flow of the Thames at Teddington Weir put in by the Conservators shows how this arises. Under the head of March, 1889, the total discharge for the month is said to be 167,945 million gallons; this ought to be only 67,945 million gallons; making which correction, the value of the flow from the ground, called 'equivalent rainfall per annum' in the table put in by Mr. G. J. More, for 1889, should read 8.57, and not 10.4 in."

Mr. Binnie proceeded to analyse the various figures relating to this subject, and he worked them into a series of ten tables, which embody the facts of the case for the nine years from 1883 to 1891 inclusive.

SKETCH FOR A DECORATIVE PANEL.

This is a sketch by Miss E. M. Rope for a panel to be executed either in wood or metal for a chimney-piece or other similar position.

BENNETT'S HYDRAULIC SELF-CLEANSING STREET GULLY.

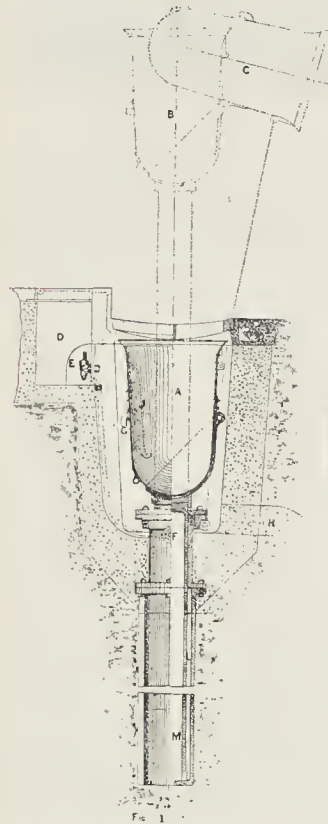
On the next page we give an illustration of a system for cleansing street gullies of detritus, invented by Mr. W. B. G. Bennett, C.E., Borough Engineer of Southampton. The *modus operandi* is as follows:—When the mud-cart arrives at the point where the gully is fixed, the man turns back the grate and opens the water-tap, placed in an ordinary covered box in the foot-walls, which admits the water to a plunger below, when the mud-container is cart, which operation being completed, this water-tap is reversed, and the dirt-container retires to its place, the exhaust water doing duty a second time in cleansing the gully-pit. A provision is also made to flush out the container with clean water.

At Southampton one of these gullies is operated by compressed air. In that town, three miles of air main are laid in the streets in connexion with the Shone system of sewage, from which service connexions can easily be laid on, the waste heat from the combustion of the house refuse in a destructor being utilised as the motor required for compressing the air.

By this arrangement the frequent emptying

of the gullies, often much neglected, is much facilitated.

In a general system of drainage, any number of gullies can be connected to the hydraulic gully, and the combined contents discharged at one operation; in this case the container is made of larger dimensions, with special tipping gear. The same apparatus can also be worked pneumatically.



SECTION
Bennett's Hydraulic Self-Cleaning Street Gully.

REFERENCES.

Fig. 1 is a sectional elevation, showing the apparatus arranged as an ordinary single street-gully.

- A is the container under gratings in channel of carriage-way.
- B is the container raised to tipping level.
- C container tipped and discharging.
- D box in footpath, with hinged cover containing cock E, by which the supply of water to the cylinder, F, and the exhaust from plunger G is regulated by a hand key from the foot-walk.
- F ferula for connecting supply and exhaust pipe.
- G nozzle for attaching flexible tubing to cock E for cleaning container.
- H trapped outlet from gully-pit to drain.
- I tipping line.

SOCIETY OF ENGINEERS.—The thirty-eighth annual general meeting of this Society was held on Monday last, at the rooms of the Society, 17, Victoria-street, Westminster, S.W. The chair was occupied by Mr. Joseph William Wilson, jun., President. The following gentlemen were duly elected by ballot, as the Council and Officers for 1893, viz.:—As President, Mr. William Andrew McIntosh Valon; as Vice-Presidents, Messrs. George Abraham Goodwin, Henry Fajja, and William George Pierce; as Ordinary Members of Council, Messrs. R. W. Peregrine Birch, Chas. Claude Carpenter, Samuel Herbert Cox, Charles Gandon, Thomas Bell Lightfoot, Perry Fairfax Nurse, William Bradford, and George Maxwell Lawford; as Hon. Secretary and Treasurer, Mr. Alfred Williams; as joint Honorary Auditors, Messrs. Alfred Lass, F.C.A., and Samuel Wood, F.C.A. The proceedings were terminated by a vote of thanks to the President, Council, and officers for 1892, which was duly acknowledged by the President. The annual dinner of the Society was held on Wednesday evening last.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—A general meeting of this Society was held on the 6th inst., at 35, George-street, at which Mr. J. Gibbons Sankey, M.A., was elected a Fellow, and Mr. Bernard H. Bramell an Associate. The third sessional paper was read by Mr. R. Knill Freeman, F.R.I.B.A., entitled "A Few Notes." A great variety of matters important to architects were referred to, including education, practice, competitions, &c., with much useful advice to the junior members. An interesting discussion followed. The annual dinner was held at the Queen's Hotel, the President, Mr. Salomons, in the chair. After the usual loyal toasts, the President of the Royal Institute of British Architects responded for "The Institute."

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting was held last week, the President in the chair. A paper was read by Mr. A. N. Paterson, M.A., A.R.I.B.A., on "Colour as a Means of Architectural Expression."

ARCHITECTURAL SECTION OF THE GLASGOW PHILOSOPHICAL SOCIETY.—A meeting of the Architectural Section of the Glasgow Philosophical Society was held on the 12th inst., Mr. Campbell Douglas, F.R.I.B.A., President, in the chair, at which Mr. J. Lindsay Miller, secretary of the section, gave a paper entitled "Notes on our Cathedral," dealing with the subject historically and architecturally.

THE LONDON COUNTY COUNCIL.

A SPECIAL meeting of this Council was held on Friday, the 9th inst., the Chairman, Mr. John Hutton, presiding.

Premature Publication of Reports.—The Chairman referred to the growing frequency with which reports and conclusions of committees are prematurely published in the daily and provincial journals before they are formally before the Council. As he had ascertained that these reports had not been communicated to the journals in question by the office staff, he could only come to the conclusion that they must be communicated by members. He trusted that there would not be any repetition of such a breach of confidence on the part of members.

Legislation for next Session.—The remainder of the special sitting was chiefly occupied by the consideration of clauses of Bills to be promoted by the Council in the next session of Parliament.

The usual weekly meeting of the Council was held on Tuesday last, the Chairman, Mr. John Hutton, presiding.

Report of the Fair Wages Committee.—The following report of the Fair Wages Committee as to payment of trade union rate of wages, form of contract, &c., was presented:—

"On May 27, 1892, the Council referred to us the following resolution, passed on the motion of Mr. John Burns, M.P., and the amendment of Sir Thomas Farrer:—

"That all contractors be compelled to sign a declaration that they pay the trades union rate of wages and observe the hours of labour and conditions recognised by the trades unions in the place or places where the contract is executed, and that the hours and wages be inserted in and form part of the contract by way of schedule, and that penalties be enforced for any breach of agreement."

The Council also referred the following proposals by Mr. Stockbridge:—

"1. Should any workmen in the employment of the contractor be not paid the schedule wages, then the Council shall be at liberty to deduct from the money payable to the contractor under the contract a sum equal to double the amount of such deficiency, and the Council shall be at liberty out of such sums so deducted to pay the contractor's workmen any deficiency in their contract."

"2. The contractor shall undertake to keep proper time-books and wages books in connection with the contract work, and such books shall at all times be open to the inspection of such person or persons as may be appointed by the Council for this purpose, and the contractor shall, under a penalty, be bound to make and deliver to the Council whenever required a declaration that the hours and wages set out in the time and wages books are correct, and that he has paid the several sums charged therein."

And also the following proposal by Mr. Leon:—
"But London rates of wages shall be paid by every contractor to all workmen employed on a London County Council work within twenty miles of London."

We have proceeded upon those resolutions at considerable length, and have endeavoured to ascertain from other public bodies how far they have proceeded in this direction. We have been

unable to gain much, or indeed any, guidance from their proceedings, with the exception, perhaps, of some of the Government Departments, which have at least to some extent adopted the system of scheduling rates of wages.

As the result of our deliberations, we have come to the conclusion that the best way in which the original resolution of the Council can be carried into effect is by the Council adopting the proposed standing orders appended hereto. It will be seen from these standing orders that we do not at present see our way to carry the resolution of the Council into effect with reference to contracts for clothing, owing to the absence of unanimity amongst the trade unions concerned. . . .

It will be seen from the perusal of the proposed standing orders that we are of opinion that the resolution of May 27 should be extended, so that the principle shall apply to all work carried out by the Council under its recent regulations with respect to works to be executed without the intervention of a contractor. It is thought by the Committee that if the Council requires contractors to pay and observe the rates of wages and conditions of labour recognised by trade unions, it can hardly with justice object to be bound by a similar regulation.

It will also be seen that the proposed standing orders provide for the making and keeping of a wages and hours of labour log at the County Hall, and that this log shall be open at all times to public inspection. We have been unable to obtain sufficient information to enable us to compile a complete log for submission to the Council, and suggest that this task should be continued by the Works Committee, which, if the recommendation of this Committee is adopted, will be immediately concerned in the matter.

It will be seen from the proposed standing orders and the form of contract therein that we have adopted the second proposal by Mr. Stockbridge. After careful consideration, we have not thought it desirable to recommend the Council to adopt the first proposal, as we think that this proposal would be somewhat difficult to apply, and might be construed to suggest what we think is not the fact, that the Council has no direct or legitimate interest in the payment of good wages. We think that the Council is directly interested in the payment of good wages and the observance of proper conditions of labour for the purpose of securing good and substantial work.

With regard to Mr. Leon's proposal, we think that it should be adopted, and have inserted words in the proposed standing orders which we believe will carry it into effect.

It will be seen from the proposed standing orders that we have not thought it within the scope of our reference to prohibit overtime altogether, but the proposed clause only permits overtime where it is strictly in accordance with the rules of the trade union concerned.

The question of sub-contracting has engaged our attention on several occasions, and ultimately we have come to the conclusion that, although in any case of sub-contracting the stipulations and penalties with regard to rates of wages and hours of labour in the original contract should apply, it is not desirable that these stipulations should be set out in detail in the original contract. We have therefore come to the conclusion that the clause at present inserted in contracts for the purpose of preventing sub-contracting should be inserted in future in the manner set out in the proposed standing orders, and that, in the event of permission to sub-contract being applied for, such permission should only be given upon the contractor undertaking in the terms of the proposed standing order, No. 6.

In order to show how stringently other public bodies have dealt with sub-contracting,—no doubt with a view to its prevention,—we may mention that the Corporation of Nottingham has adopted the following clause:—"That every contractor who does not propose to carry out every part of the work himself, shall, with his tender, supply the name of every contractor he intends to employ." We have not, however, thought it necessary to go so far as this.

We are advised and believe that the penalties and stipulations we have inserted in the proposed form of contract would have full legal force and effect. We therefore recommend—

"That for the purpose of carrying into effect the before-mentioned resolution of the Council of the 27th May, 1892, the following standing orders be adopted by the Council—

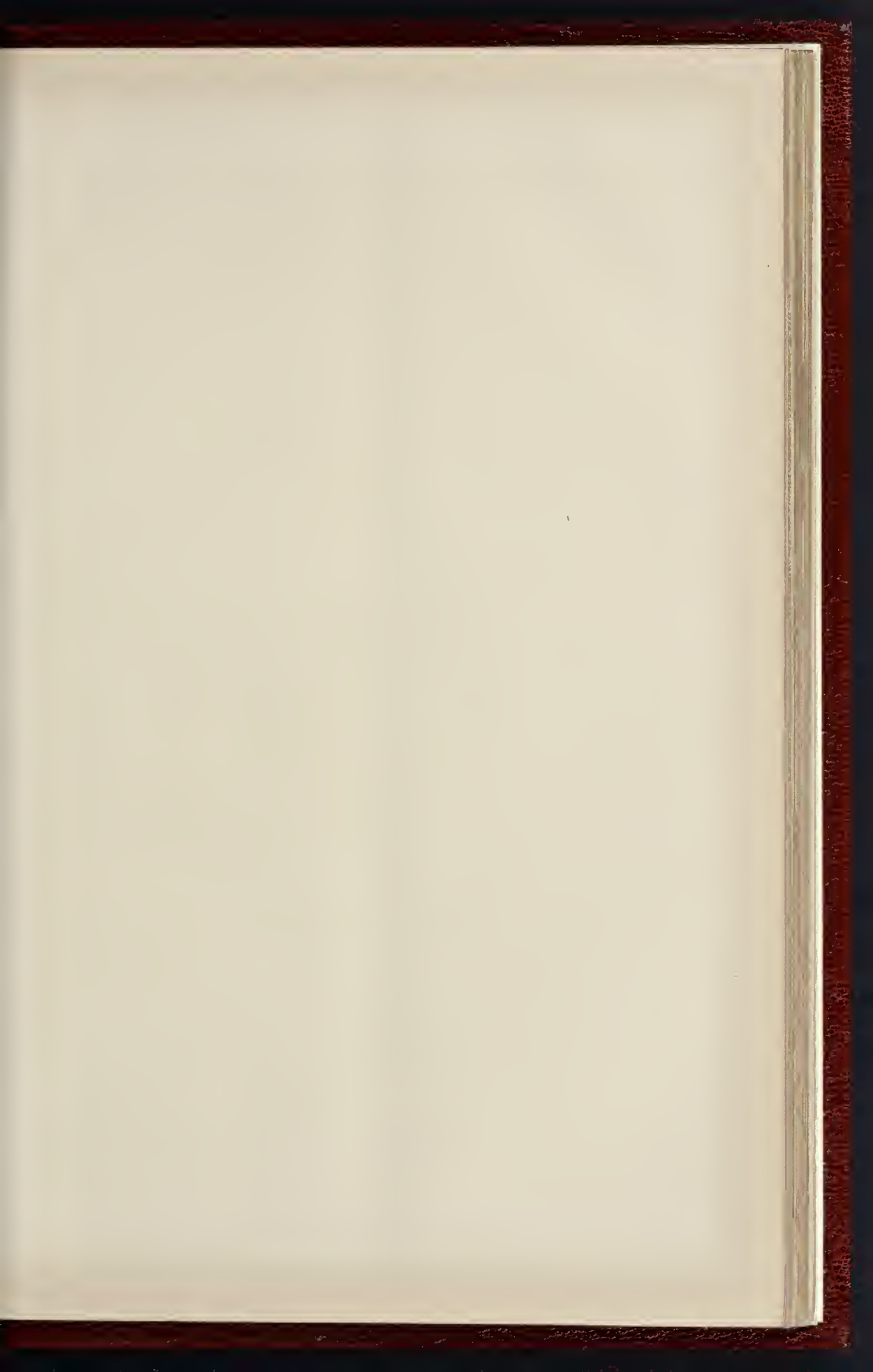
FAIR WAGES CLAUSES.

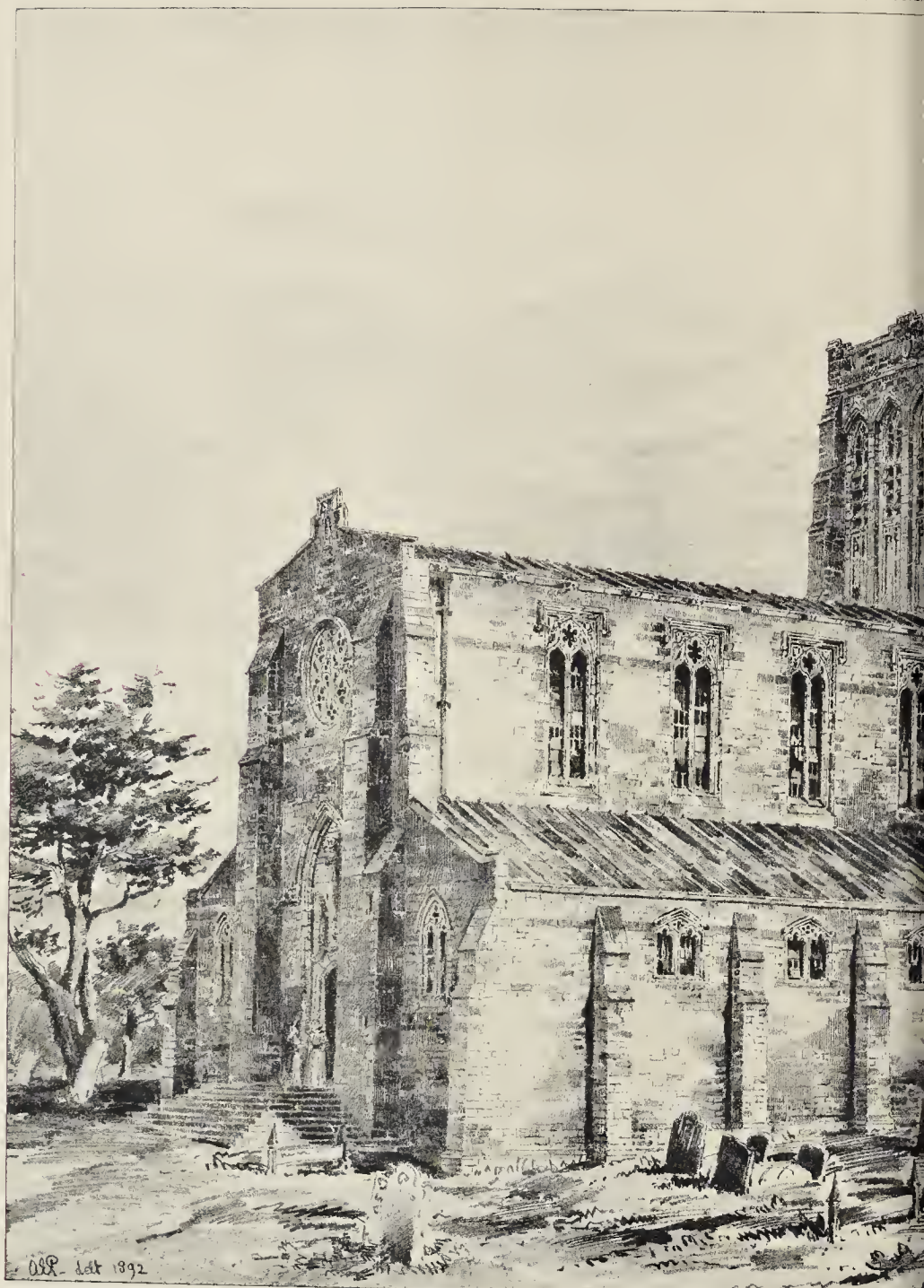
Suggested Standing Orders as to Contracts, except Contracts for Clothing.

1. There shall be kept, at the County Hall, a list of the rates of wages and the hours of labour to be paid and observed by the Council in works which are in the nature of construction or manufacture, and which the Council may resolve to carry out without the intervention of a contractor.

The list shall be settled by the Council on the recommendation of the Works and Stores Committee, and shall be based on the rates of wages and hours of labour recommended by the various trade unions in London, and shall form part of the standing orders of the Council.

The list shall at all times be open to public inspection.

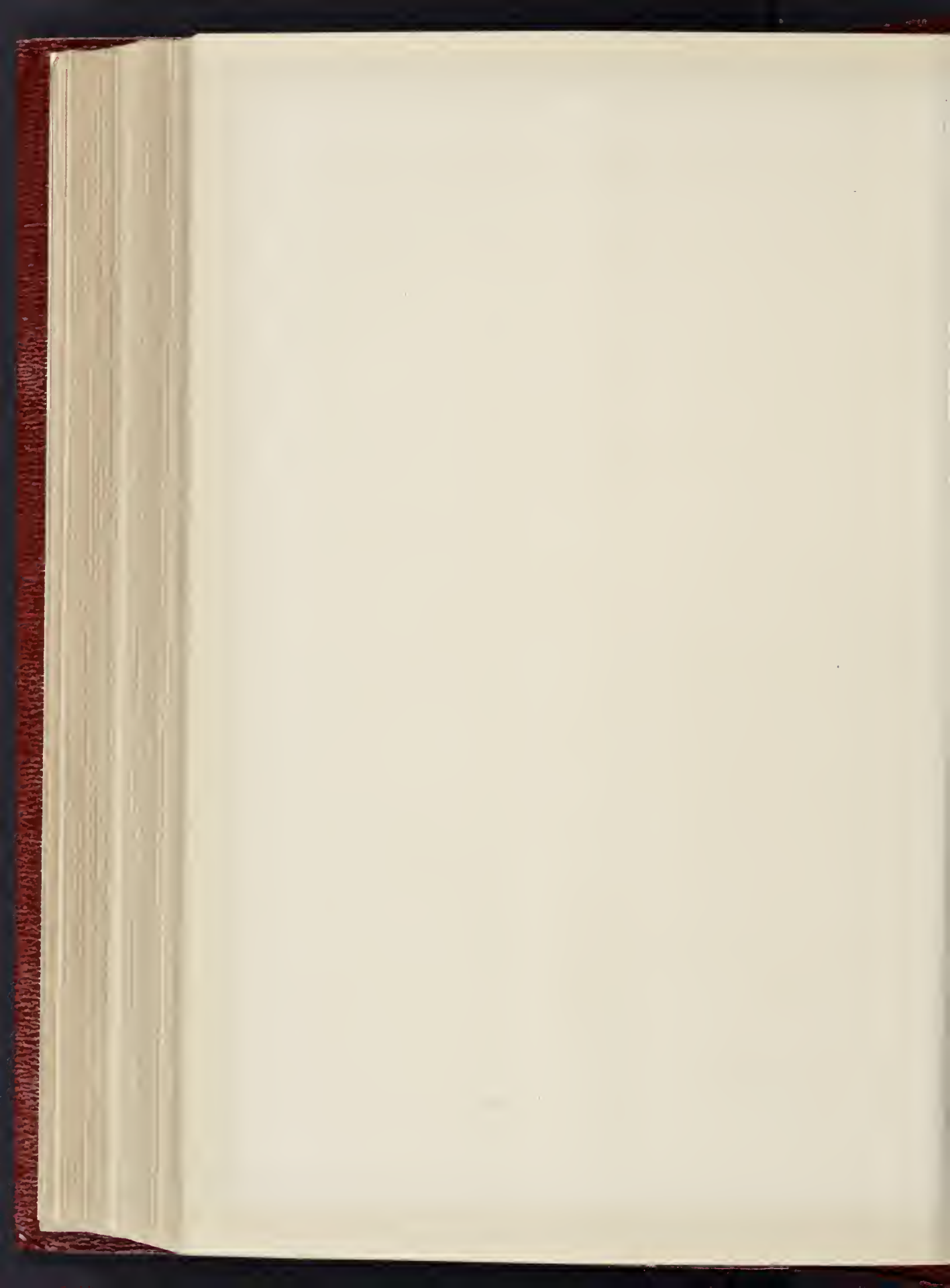


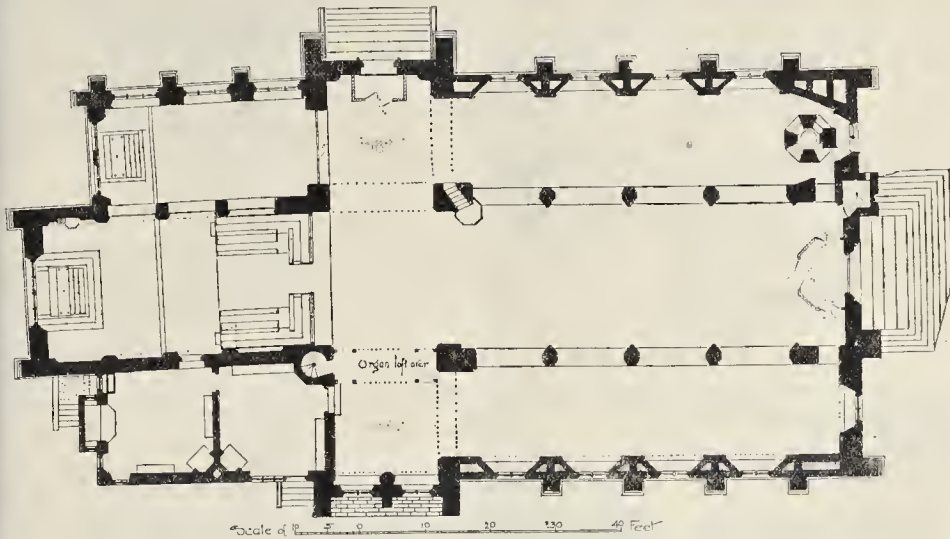


Royal Academy Exhibition, 1892



*Design submitted in Competition for
S. Luke's Church Warrington.
F. C. Eden, R. A. & J. L. Williams Archts*





Competition Design for St. Luke's Church, Wincington: Plan.

Illustrations.

COMPETITION DESIGN FOR ST. LUKE'S, WINNINGTON.

THIS design, made for competition purposes, is based upon the regulation Gothic plan, and worked out in a purely archaeological manner. As the nature of the site made it advisable that the main part of the church should lie parallel to the road, the axis of the chancel was deflected to the north in order to give the eastern limb a better orientation.

The drawing was exhibited at this year's Royal Academy Exhibition.

F. C. EDEN AND J. L. WILLIAMS.

DESIGN FOR A TOWN MANSION.

This design, like the one by Mr. Bartlett published in the *Builder* of November 19, was made in competition for the Royal Academy Gold Medal, which in this instance at least has elicited some good designs. In this one the cornice, and the rich decoration over the principal windows, contrast well with the plain treatment of the remainder of the walls, and the manner in which the halnstrade of the porch is connected with that of the balconies is a good point, connecting the porch with the house and with the range of windows of the principal rooms. The whole is a dignified elevation, such as would take its place well in such a street as Pall Mall, for example.

The design is by Mr. Herbert Baker, and was exhibited at the last Royal Academy Exhibition. We are unable to give a plan or any further details as to the design, owing to the absence of the author from England at present.

THE INTERIOR OF A LONDON LIBRARY.

The library of which the interior is shown was a small one in a London house, whose sole light was got by a bay window at the west end. One side alone was fitted with bookcases; the other side and end were panelled only, as this part of the room was to be hung with engravings. The whole room had to be kept simple and subdued; the woodwork was unpolished walnut, and the upper part was hung with old painted Spanish leather. In the frieze of the bookcase oval pieces of fine marbles were inserted as jewels, and in the frieze of the doorcase there was a flat panel of Rosso antico, with "Libri nunti magistri," incised and gilt. The chimney-piece was an old one of statuary marble, inlaid with verde antico, with a looking-glass over it; and the

2. In inviting tenders for work to be executed within twenty miles of Charing-cross, the advertisements and instructions for tender shall state that in the case of all workmen to be employed by the contractor he will be required to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list, and that such rates of wages and hours of labour will be inserted in a schedule, and will form part of the contract, and penalties shall be enforced for any breach thereof.

3. When the contractor in connexion with the works contracted for intends to employ labour at a greater distance than twenty miles from Charing-cross, he shall be required, in addition to the above, to insert in the said schedule the names of the various classes of labour which he intends to employ, together with the places where such labour will be employed, and the rates of wages and hours of labour to be paid and observed in respect to each class of labour, and no tender shall be accepted unless the rates of wages and hours of labour inserted in such schedule be proved to be the rates and hours recognised at the date of the tender by the trades unions of the district where the work is to be done, and such schedule will be added to and will form part of the contract, and penalties shall be enforced for any breach thereof.

4. In all contracts for the supply of any raw material or manufactured articles, other than clothing, a condition shall be inserted that with respect to all materials or articles produced or manufactured by the contractor, the contractor will, in the production or manufacture thereof, pay and observe the following rates of wages and hours of labour, viz.:-

(a) Where the production or manufacture thereof is carried on within twenty miles of Charing-cross, the rates of wages and hours of labour appearing in the Council's list.

(b) Where the production or manufacture thereof is carried on at a greater distance than twenty miles from Charing-cross, the rates of wages and hours of labour recognised by the trade unions of the district where it is carried on.

Provided that this standing order shall not apply to the supply of articles not manufactured by the contractor.

5. All instructions for tender and contracts under these standing orders shall be respectively, as far as possible, in the following forms.

[Here follow the forms of "instructions for tender," forms of contract, schedule, &c., for which we have no space this week, although we hope to give them in a future issue.]

Sir Thomas Farrer moved an amendment providing that the proposed first standing order should so read that the list of the rates of wages and hours of labour to be paid and observed by the Council should be applied and enforced in those cases, and in those cases only, in which there was a trade union of which the rates of wages and rules were recognised and generally observed in the trade. He thought that it was quite possible that the steps the Labour Party were taking, instead of relieving pauperism, would add to it, and make the lot of the sweated harder than it was. If the report was adopted they would have to surrender all their powers and responsibilities into the hands of their own employees, and this would be disgraceful. He appealed to the Council, as they valued their own dignity and the future welfare of London, not to give them-

selves, hand and foot, over to any trade union whatever.

Mr. H. Debenham seconded the amendment, which he said was to limit the action of the Council in matters of contract to the payment of fair wages.

Mr. Burns, M.P., objected to the amendment as vague and indefinite. The recommendations of the Committee embodied a practical, operative, and automatic schedule of wages, representing what masters and men had come to by common agreement.

After some further discussion, the amendment was rejected, on a division, by 62 votes to 46.

Lord Monkswell then moved another amendment:—"That after the second word 'labour,' in Clause 1, the word 'generally' be inserted, and after the word 'recognised' the words 'and enforced' be inserted."

Mr. Orsman seconded the amendment, which, however, was defeated by 53 votes to 52.

Mr. Frederic Harrison next moved to insert after the word "recognised" the words "and in practice obtained."

This amendment was carried by 73 votes to 29, and the further consideration of the report was postponed to a special meeting to be held this Friday, December 16.

Proposed Statue of Dickens.—On the recommendation of the Parks and Open Spaces Committee, the Council declined to accept a bronze statue of Charles Dickens, offered as a gift by Mr. Elwell, an American sculptor, on the ground that the author had left on record a strong desire that no statue of him should be erected.

The Public Health and Housing Committee recommended that clauses should be incorporated in the General Powers Bill to give the Council powers to deal with provisions to meet an outbreak of cholera should it occur. This was agreed to, after some discussion. The Council subsequently adjourned.

ARCHITECTURAL PARTNERSHIP.—We learn that Mr. F. E. F. Bailey, A.R.I.B.A., Bridge-street, Walsall, and Mr. H. H. McConnell, A.R.I.B.A., The Bridge, Walsall, have entered into partnership, and from January 1 prox. will carry on practice as architects and surveyors, at Imperial-buildings, Bridge-street, Walsall, under the style of "Bailey & McConnell."

THE SURVEYORS' INSTITUTION EXAMINATIONS, 1893.—We are informed that 251 candidates have entered their names for the approaching examinations. Of this number 71 are candidates for the Studentship, 133 for the Associateship, and 47 for the Fellowship; representing, in the aggregate, an increase of nearly 25 per cent. on the numbers of any previous year.



Plan of House at Eastbourne.

top of the bookcase was to be used as a stand for antique Greek vases.

The architect was Mr. G. Aitchison, A.R.A., and the drawing was exhibited at the last Royal Academy Exhibition.

DINING-ROOM, HOUSE AT SAN SEBASTIAN, SPAIN.

THIS is the interior elevation of the dining-room in the house which forms the summer residence of the Queen Regent of Spain, at San Sebastian. There is a wooden dado and chimney-piece, and a plaster ceiling divided up by tracery into a geometrical pattern; a similar design forms part of the frieze, or rather (apparently) the ceiling design is continued down on to the wall so far. Tapestry is introduced in the upper part of the wall.

Mr. R. Seldon Wornum was the architect, and the drawing was hung at the last Royal Academy Exhibition.

HOUSE AT EASTBOURNE.

THIS house has been lately erected at the junction of Staveley and Baxton roads at Eastbourne. It is heated by Norwegian hot-air stoves, and lighted throughout by electricity. The walls are of red brick, and the roof is covered with Broseley tiles. The contractor for the work was Mr. J. Harding, of Eastbourne. The architect was Mr. Frederick W. Waller, of Gloucester. The house was built for Professor Haxley.

The drawing was exhibited at the Royal Academy this year, but was wrongly described in the catalogue as "House at Sunningdale" by "Messrs. Waller & Son." The correct title is as given on the plate.

LODGE AND GATES TO HOUSE, SAN SEBASTIAN, SPAIN.

THIS forms one of the three entrances to the Queen Regent's residence mentioned above, comprising lodge, guard-room, and gates. The walls are built of Barcelona red brick and local stone dressings, and the roof is covered with Broseley tiles. The contractor was Sr. Benito Olasagasti; and the architect Mr. R. Seldon Wornum. The drawing was exhibited at the Royal Academy.

The guard-room occupies the portion under the gable to the right of the drawing; the living-rooms are next the gate. The plan was unfortunately sent to us too late for production.

THE ENGLISH IRON TRADE.—There is little of note to record in the condition of the English iron market. Pig-iron is tolerably steady, although transactions do not exhibit any increase. Finished iron manifests no improvement, and there is little or no change in the tin-plate branch. In steel a few more orders have been placed for plates on shipbuilding account, and prices show a corresponding amelioration. Shipbuilders are apparently a trifle better placed for work than recently, and engineers and ironfounders report a slight change for the better. The coal trade is moderate. The chief event of the week in this department is the decision of the South Wales miners to join the Federation of Great Britain.—*Iron.*

Books.

Cairo. Sketches of its History, Monuments, and Social Life. By STANLEY LANE-POOLE. London: J. S. Virtue & Co. 1892.

THIS is in size and method of handling a "popular" book, professedly intended as a guide for the ordinary tourist on a pleasure visit to Egypt; and, considering the wealth of material obliged to be compressed into a very moderate compass, the devotion of much space to matters purely architectural could not be expected. But although the buildings of Cairo occupy a comparatively small portion of the book, it is evidently from a consideration of the balance of subjects required by the average reader, and not from any lack of adequate knowledge on the part of the author.

The buildings most worthy of attention are the mosques, of which over three hundred still remain, many of them ranking among the loveliest architectural creations in the world, second only, as we may claim, to some of the Christian churches of the same period; but, at any rate, as Mr. Lane-Poole says, "the noblest examples of Saracenic architecture that can be seen in all the wide empire of Islam." All the principal mosques, some of the most beautiful of which were built as tombs, are well described, and their general appearance and most striking details illustrated; and though no attempt is made to analyse their variations of style, their constructive principles, or the elements of their beauty, enough is told about them to give the general reader a fair idea of their character, and to make the lover of art look forward with anticipation to the larger hook which Mr. Lane-Poole is preparing. In the chapter on "The Museum of Arab Art" (in connexion with which it may be noted, for the use of those scrupulous about nomenclature, that the author gives his reasons at length for preferring "Saracenic" as the best general designation for all the styles of architecture variously known as "Arabian," "Mohammedan," "Moorish," or "Saracenic"), there is much valuable information about decoration and furniture, both religious and domestic, and it is pleasant to learn how fine a collection is now, only just in time, being secured of these fast perishing relics of the great period of Calene history.

Another chapter of peculiar interest is that headed "Christian Babylon," an account of the Copts and their churches at Babylon by Old Cairo. It may be new to many that, through this now despised and little-known race, we may trace a connexion between our own religious customs and art and those of ancient Egypt. "Irish Christianity," we are told, "the great civilising agent of the early Middle Ages among the northern nations, was the child of the Egyptian Church;" and as, on the one hand, the work of the Irish monks of the ninth and tenth centuries has left abiding traces among all the nations of North-Western Europe, so, on the other, the Egyptian, now called the Coptic, Church has been always, and is at the present day, composed of "true survivors of the people whom Pharaoh ruled, and who built the pyramids of Giza." The exact value of this clue in elucidating our own ecclesiastical antiquities may be variously

appraised by different persons, but it is certain that there is much about the existing Coptic churches still worthy of careful study, and the notices of some of them to be found here form one of the most attractive features of this really fascinating book.

The hook is a very good example of its class, put together in a logical manner; the illustrations are both well-selected and well-executed, and paper, type, and general make-up leave nothing to be desired.

A Manual of Railway Law. By F. M. PRESTON, B.A., LL.B. London: Adam and Charles Black.

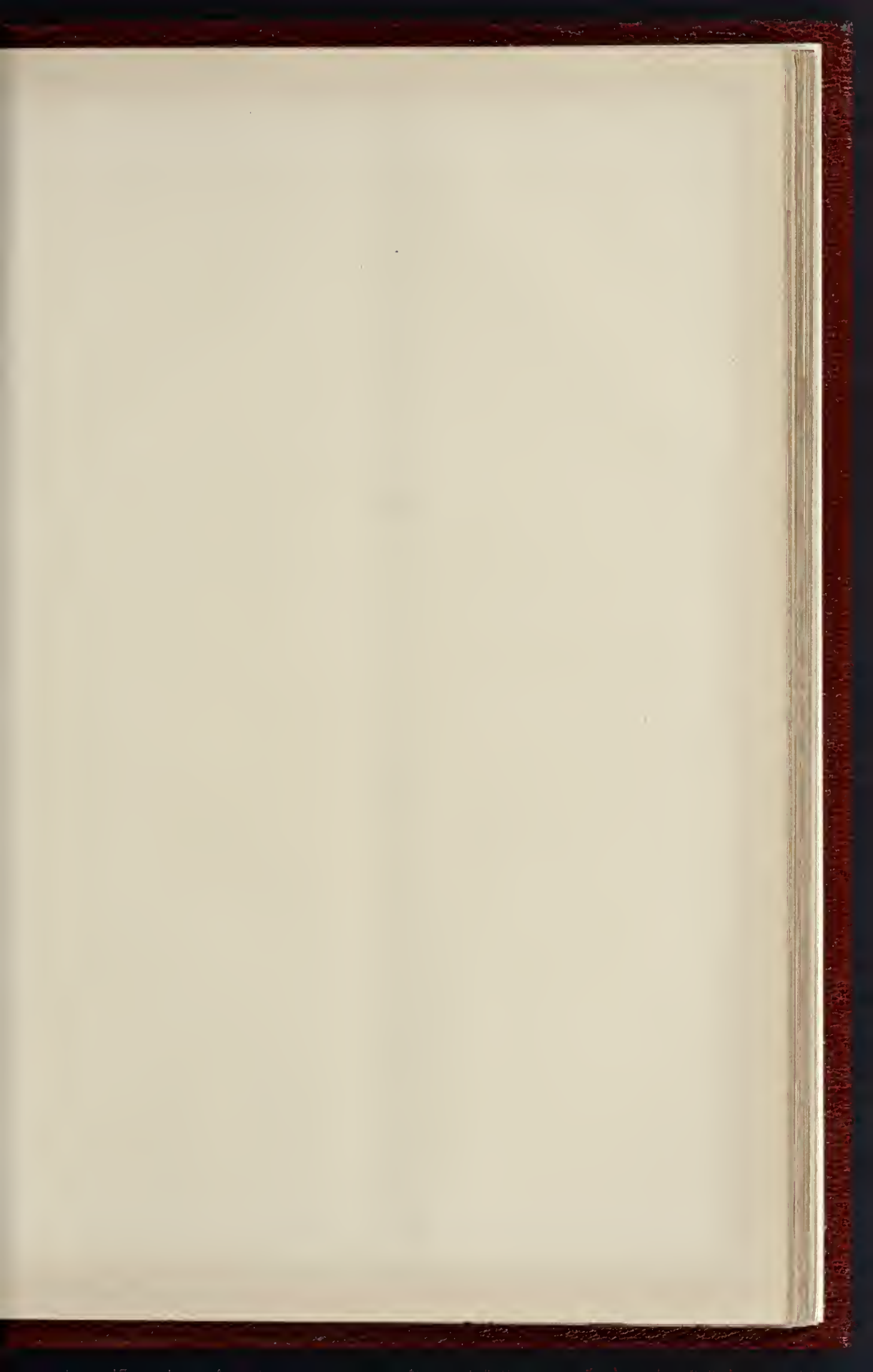
THIS will not be the least serviceable of Messrs. Black's series of Manuals of Practical Law, and its utility will, in all probability, soon be put to the test. The revision of rates which has taken the railway companies so long to accomplish, and which takes effect on January 1, will hardly result in giving unqualified satisfaction to their customers. Cattle-dealers, for instance, have already received notice of the abolition of the time-honoured privilege of free passes for drovers in charge of live-stock; and this may be taken as affording evidence that for any reductions in rates necessitated by the requirements of the new schedules, the companies are preparing to recoup themselves in other directions. "It is better for a layman to go to a law-hook than to go to law" stands as a motto for this series of Manuals; and Mr. Preston's work, comprising as it does a number of quotations from the Law Reports, and an appendix in which is embodied many of the charges authorised by the new Acts, will doubtless be found very convenient for reference. A considerable proportion of the recent cases quoted have been commented upon in our columns. Many decisions which were frequently quoted in actions tried prior to the passing of the Act of 1888, turned upon disputed points which have been dealt with in that measure, and, consequently, they will have but little bearing upon cases arising under the dispensation commencing with the appointment of the present Railway Commission. Many questions, however, may yet arise for which parallels will be found among Mr. Preston's examples, and the arguments and rulings in the cases set forth may afford precedents tending to the avoidance of needless litigation.

The introductory chapter may be described as historical, and is followed by detailed particulars of the course pursued in the promotion of a railway company, the acquisition of land, and the construction of the railway, as regards legal formalities and Parliamentary powers. In this connexion much information is given concerning the obligations imposed upon railway companies with regard to the disposition of superfluous lands, which is interesting and instructive; while the question of compensation for lands acquired is also considered. The remaining chapters deal with the rights, powers, duties, and obligations of the companies, both as carriers of goods and passengers, and as regards the general public. It is noticeable that the word "traffic," as defined in the Railway and Canal Traffic Act of 1854, includes passengers; and that the section which provides that railway companies "shall afford reasonable facilities for the receiving, forwarding, and delivering of traffic," applies to passengers as well as goods.

The language employed throughout the book is very free from legal technicalities, although terms are occasionally met with which will remind the reader that they have other significations than those ordinarily associated with them; as, for instance, when it is stated that among those who may vote in person or by proxy at shareholders' meetings are "committees of lunatics or idiots."

Histoire de la Sculpture Grecque. Par MAXIME COLLIGNON, ancien membre de l'École Française d'Athènes, &c. Tome premier. Les origines, les primitifs, l'archaïsme avancé, l'époque des grands maîtres du cinquième siècle. Ouvrage illustré de 11 planches hors texte en chromo-lithographie ou en héliogravure et de 275 gravures dans le text. Paris: Librairie de Firmin Didot et Cie., Rue Jacob, 56. 1892.

M. COLLIGNON is well known already to English students of Greek art by his two manuals on Greek archaeology and mythology, which long ago appeared in English form. Those,





Royal Academy Exhibition, 1892

INTERIOR OF A LIBRARY IN L



Royal Academy Exhibition, 1892

DINING ROOM HOUSE AT ST SEBASTIAN.



MR. G. AITCHISON, A R A , ARCHITECT.

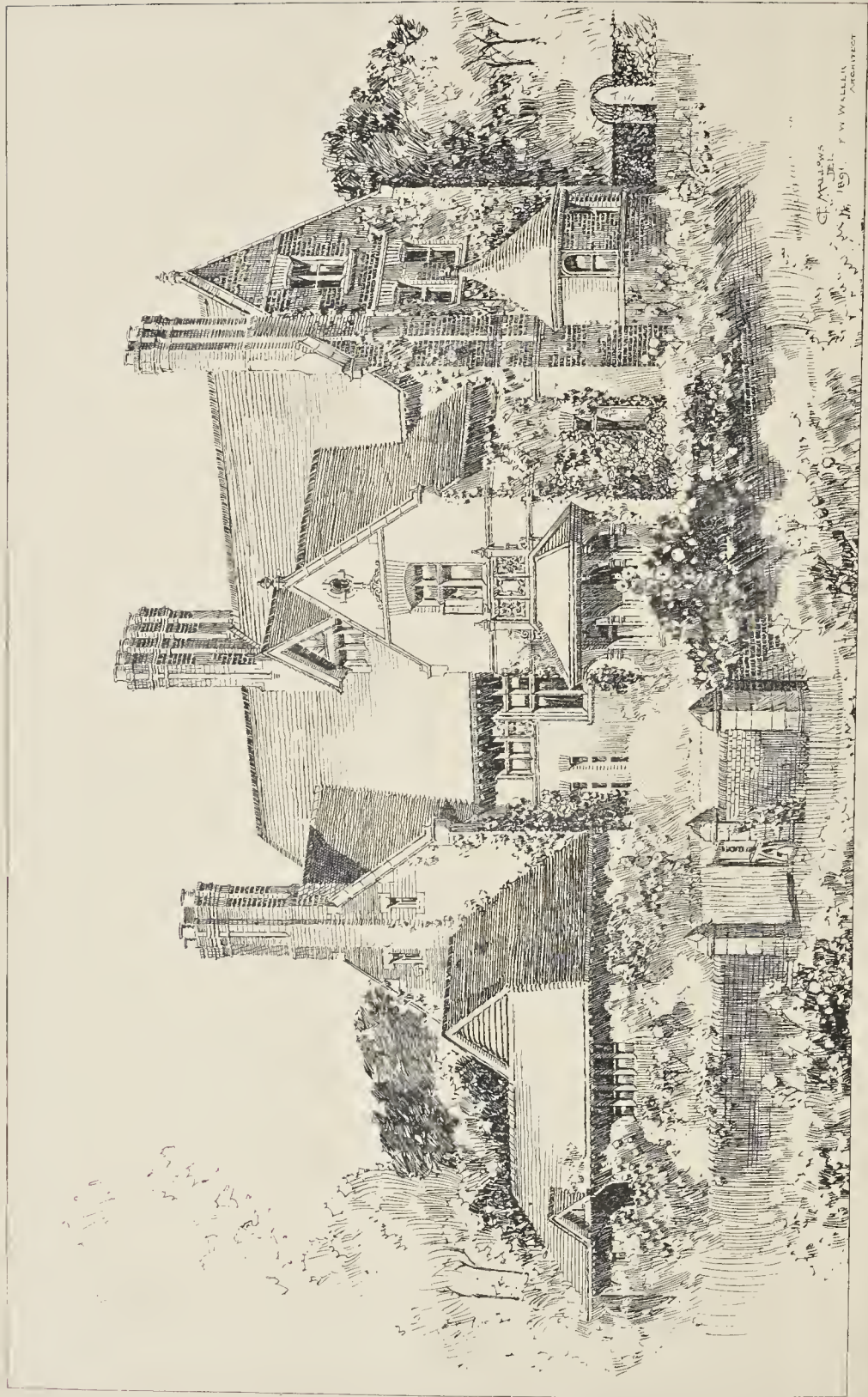


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MR. R. SELDEN WORNUM, F R I B A , ARCHITECT

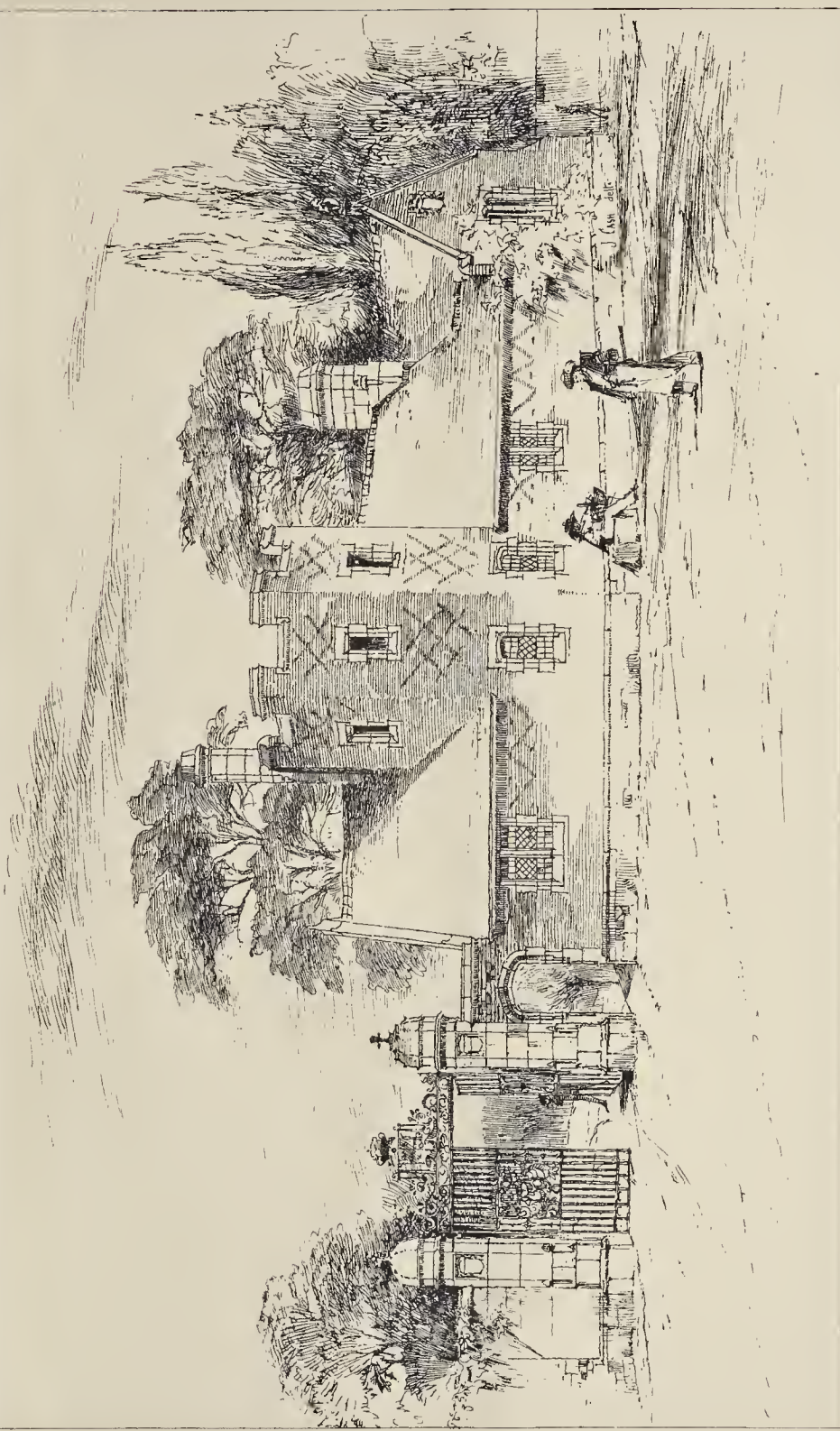


THE BUILDER. DECEMBER 17, 1892.



HOUSE AT EASTBOURNE.—MR. E. W. WALLER, ARCHITECT.

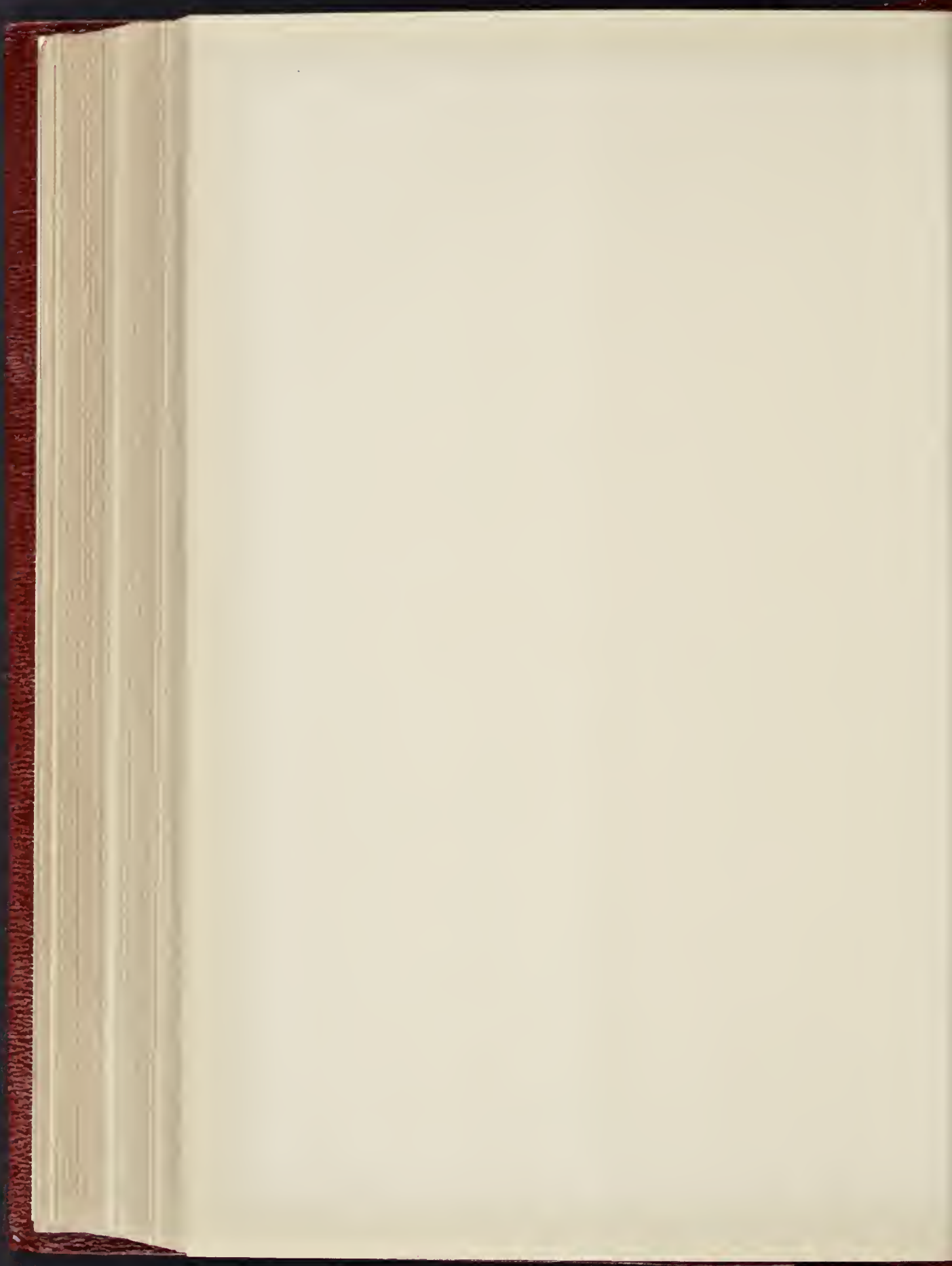
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HOUSE AT ST. SEBASTIAN, SPAIN. LODGE AND GATES—MR. R. SELDEN WORNUM, F.R.I.B.A., ARCHITECT

Royal Academy Exhibition, 1892.

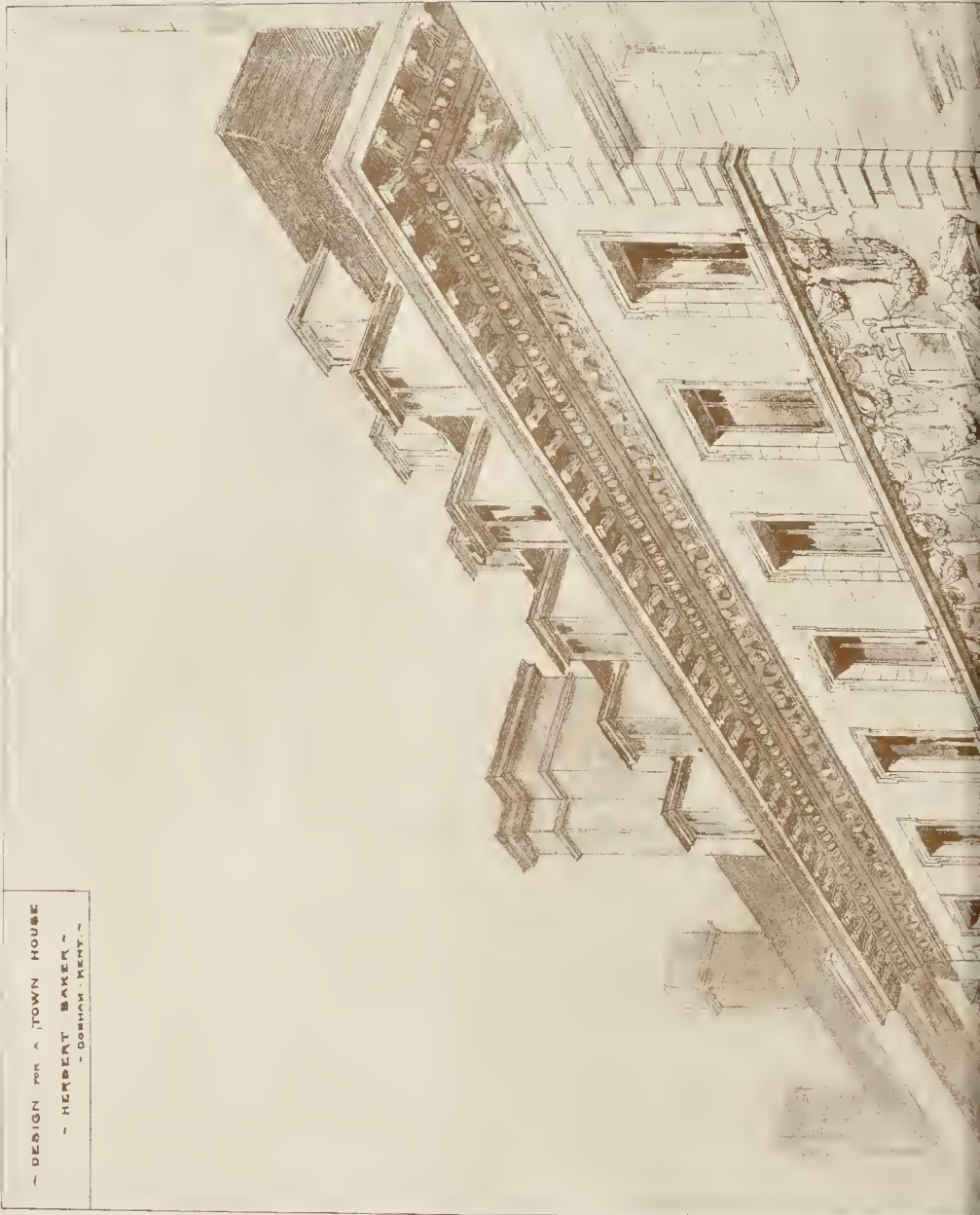
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B. & CO. 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 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THE BUILDER, DECEMBER 17, 1892.

~ DESIGN FOR A TOWN HOUSE
~ HERBERT BAKER ~
~ DOBHAM, KENT. ~





ROYAL-RICK AND WIDE

THE PHOTO-GRAPHER & CO. 48 & 5 EAST HANING STREET LONDON E.C.

DESIGN FOR A TOWN MANSION — BY MR HERBERT BAKER, A.R.I.B.A.

Royal Academy Exhibition, 1892



and they are many, who have profited by these elementary books will be glad to follow the author's further lead. The sumptuous volume before us was much wanted. It covers nearly the same ground as Mr. Murray's history of Greek sculpture; but Mr. Murray's second edition, which appeared some time ago, though it is excellent, and to every student of the British Museum indispensable, suffers, necessarily, from being a second edition. It is the first edition, with supplementary matter, not, of course, the history of Greek sculpture, re-written, as in some respects it now has to be, by the light of recent discoveries. M. Collignon's book, we predict, will be the standard reference work till it, in its turn, falls out of date, and will largely replace the earlier histories of Mr. Perry and Mr. Mitchell. An excellent example of M. Collignon's lucid and easy way of dealing with a complex and obscure subject is given in his chapter (page 53), "Origine et Date de la Civilisation Mycénienne." We have seen nowhere so good a summary, clear without dogmatism, of this vexed question. M. Collignon passes in review the now obsolete theory of M. Stephani that the Schliemann discoveries at Mycenæ are the relics of barbarian hordes of the third or fourth century A.D., a theory promptly and efficiently disposed of by Prof. Gardner. Next came the Carian theory, started by Dr. Koehler and supported by Messrs. Dittmaler and Studniczka. This theory, based largely on the absence of finds in the Acropolis of Mycenæ, fell in its turn when these finds were found in abundance in the lower town. Both theories fell before that which now holds its ground, and which seems to be of always increasing conviction, *i.e.*, that the Mycæan civilisation is Achaean, *Ἀχαιοὶ*, Ἀχαιοί, as Homer has it ("Il.", ix. 177). But the problem is not solved so lightly. This civilisation is one that extended far beyond the Argos of Homer to Attica, to Boeotia, to the islands. The question that next arises is, if Achaean, where was its original *foyer*? Where did this art, made up of elements from Asia Minor, from Egypt, take its rise? Mitcheffer said from Crete. That theory held for a time; now we look rather to the mainland; there, at least is the crucible where the diverse elements were fused, as M. Collignon puts it:—"Composés à ses débuts, il est devenu franchement indigène." As to date, the author leaves, as we must leave, the starting-point unfixd, and puts, as most do, the Dorian invasion as the terminus *ante quem*; but he warns us that the break was no sudden one. As M. Reinach has well put it:—"L'invasion doriennne est pour la Grèce comme le début d'un long moyen âge qui efface les traces d'une culture déjà florissante." We reserve further comment on an admirable hook till the issue of the second volume, to which the Parthenon marbles are deferred. It is noticeable that Pheidias is treated apart from these marbles. Evidently M. Collignon shares the now common conviction that his relation to the decorative marbles is much slighter than was formerly supposed. How impossible it is to keep up to date in archaeology is shown by the absence, already felt, of the new Selinus metopes, and the Argive head of Hera.

Gas-works, their Construction and Arrangement, and the Manufacture and Distribution of Coal-gas. Originally written by SAMUEL HUGHES, C.E. Rewritten and enlarged by WILLIAM RICHARDS, C.E. Eighth edition. London: Crosby Lockwood & Son. 1892.

THIS treatise deals comprehensively with its subject in a popular manner. Commencing with a historical sketch of the invention and development of gas lighting, it consecutively deals with the chemistry and composition of coal-gas, carbonisation, and the general construction of gas-works. The portions of most interest to architects and the general public are the chapters on consumers' meters, burners, and glasses, and the various applications of gas for heating, cooking, and other purposes. Various methods of procuring light, such as water gas, electric light, the lime light, the Gillard light receive notice, and special reference is made to the improvements in gas manufacture and in the construction of gas-holders since the last edition of this book was issued, the principal being the general application of stoking machinery, automatic manufacture of sulphate of ammonia, the process for the recovery of sulphur from waste gases, and the purification of gas by air or oxygen.

The Construction of Gas-works. Practically described by WALTER RALPH HERRING, Engineer and Manager, Huddersfield Corporation Gas Department. London: Hazell, Watson, & Viney, Limited. 1892.

THIS consists of a series of articles, which originally appeared in the *Gas and Water Review*, published in book form. A considerable portion is devoted to the construction of gas-works, and the remainder to the manufacture of gas and the appliances involved. The chapters on foundations, concrete, brickwork, timber, and ironwork are full of information as to their application to the construction of gas-works. That on foundations is particularly good, and deals with the treatment of different soils under heavy buildings; and is, therefore, of considerable interest to architects. The chapters relating to the manufacture of gas may be commended to architects who require a general knowledge of the subject. There are numerous illustrations, which are clear and concise, and a considerable portion of the book is devoted to tables of calculations and useful information.

A History of Bosbury in the Diocese and County of Hereford. By the Rev. SAMUEL BENTLEY, M.A. J. Masters & Co.

NO district in England is more rich in what may be called "village-towns" than the western-midland district. In Herefordshire especially, where neither manufacturers nor mines interfere with agricultural pursuits, they abound. They show no signs of growth, and but few of decay. They remain in much the same state as they were a century ago. A church of more than common beauty, a main street, picturesque with its half-timbered houses and quaint gables, the mansion of the squire, with, perhaps, some conventual buildings and an old Grammar School,—these are the common features of the Herefordshire villages, which have never grown into towns. Bosbury, which lies about four miles from the interesting old town of Ledbury, is a good example of this sort of parish, and has been fortunate in having in its present vicar a careful and painstaking historian, and he, too, must be congratulated upon having secured for his collections such excellent printing and binding. It is a pleasure to read the annals of a parish out of a volume so tastefully got up. The church is, of course, the chief object of interest in Bosbury. It dates back to the close of the twelfth century, but its most noteworthy features belong to a later period. They include an exceedingly beautiful Perpendicular roof-screen, rich in wood carving; a chantry chapel, built by Sir Rowland Merton about the year 1530, and some Renaissance monuments attributed to John Gald. The tower of the church stands about 60 ft. from the main building, and like other detached towers in the same county, was probably used for defensive purposes. The lordship of the Manor of Bosbury vested in the Bishop of Hereford, who had a palace there, of which some scanty remains still exist, but, except in connexion with Bishop Swinfield, they are of less interest than the old house at Harford, now the Crown Inn. Some traces may be seen of a Preceptory of Knights Templar,—still known as Temple Court,—and there is a Grammar School, with the usual history of scandalous mismanagement succeeded by root-and-branch reform at the hands of the Charity Commissioners. Altogether Bosbury presents a good deal for the delectation of the antiquary and the artist, while for those in search of absolute repose, in the midst of rural surroundings, it might even be recommended as a place of residence.

Handbook of House Property and Fine Art. By E. L. TARBUCK, Architect and Surveyor. Fifth edition, enlarged. London: Crosby Lockwood & Son. 1892.

THIS book was originally published simply as a Handbook of House Property, and as such it was a useful little book. Unfortunately, possessed by some *cacoethes scribendi*, the author amplified it by an addition on fine art. The mixture is a bad one, and the usefulness of the book has been considerably diminished. The practical part has in the edition been kept up to date; thus the provisions of the Titles Act, 1891, are noted. But the space which is taken up by the pages on fine art had much better have been given to some amplification of the practical parts of the book. For example, an

index would be useful, but there is none. When the book reaches another edition, we hope we shall find it in its original form, and with an index in place of the last chapter.

A Table of the Arts and Crafts of the Renaissance. By C. R. ASHBE, M.A. Guild and School of Handicraft, Essex House, London. 1892.

THIS is a very useful table. It is printed on a large sheet of strong paper, and groups in parallel vertical columns various classes of work, commencing from the left hand with "Historical cycles, Patrons, and Personalities," "Historical Events Bearing on Development of the Arts," "Events in English History," and then going on to "Architecture," "Sculpture and Carving," "Metal Work," &c. &c. Horizontally the events of about the same date stand on the same line, so that the sheet gives a comprehensive view of the dates of Renaissance Art. We made many years ago a chart of events in architectural history for our own use, on exactly the same scheme, but we do not remember to have seen anything of the kind in print before. It will be most useful in Art Schools; indeed why not in general schools, since we are arriving gradually at the idea that general education should include some knowledge of art?

TRADE CATALOGUES.

MESSRS GEORGE SMITH & Co., of the Sun Foundry, Glasgow, and No. 1, Dowgate-hill, London, send us a large illustrated catalogue of architectural and sanitary ironwork. Its contents are very varied and complete, and it will be found exceedingly useful by architects and builders. In saying this, however, we guard ourselves against expressing approval of all the designs for cast-iron railings, crests, and gates. The catalogue contains nearly 400 pages and thousands of illustrations, and is well worth attention.

From Messrs. J. G. Statter & Co., of Victoria-street, Westminster, and Millwall, comes an illustrated catalogue of electrical machinery and plant adapted to installations of varied character and requirements. It may be usefully referred to by architects and others who may have to make provision for electric-light installations.

Correspondence.

To the Editor of THE BUILDER.

THE ORIGIN OF THE ART-WORKER'S GUILD.

SIR,—In a brief but sympathetic notice of my article in the *Fortnightly*, on "The English Revival of Decorative Art," the writer is under a curious misapprehension as to the origin of the Art-Workers' Guild. The Guild, as I stated, was the result of the growing desire for more unity among workers in the arts of all kinds, and was quite an independent movement. So was the Arts and Crafts Exhibition Society,—quite a distinct body, he it observed, from the Guild, though sometimes confounded with it.

I hoped I had made it sufficiently clear in the article that while the most part of the painters were bent on trying to reform the Academy, the designers and craftsmen distinctly left them on that issue, desiring to make an independent exhibition.

The idea of the external unity and co-operation of the arts and crafts is essentially a non-academic idea, and it is not one which a Royal Academy can adopt or carry out in its true sense without entirely changing its character. The Academy is probably fully aware of this, and the instinct of self-preservation is naturally strong.

In the political world, when an institution has done its work it is superseded, and the principle is generally recognised that new wine must be put into new bottles. I venture to think, Sir, the same holds good in matters of art. WALTER CRANE.

THE MANSION HOUSE.

SIR,—Your correspondent "E. V.," in his description of this building in the last number (p. 465), writes: "It would be interesting to know the dates of these successive alterations, and the names of the architects under whom they were carried out." Searching among my

notes, the biographies in "The Dictionary of Architecture," and also Wheatley's "London Past and Present," I am able to compile the following statement, which may satisfy your correspondent, and add to his interesting notice:—

The first stone of the edifice was laid October 25, 1739, and it was completed in 1752; designed by George Dance, sen., the Clerk of the Works to the Corporation. The cost in 1748 was put at 42,638*l.* 8*s.* 8*d.*, including 3,900*l.* for houses pulled down. The total cost, however, is put at 71,000*l.*

The Egyptian Hall is 90 ft. long by 59 ft. wide.

The sculpture in the pediment is by Robert Taylor, who became an eminent architect, and was made a knight.

The Saloon was formed 1795 by covering in the open court, under George Dance, jun., who succeeded his father in the office of Clerk of the Works, as it was then called.

In 1796 he also removed the tall attic at the back over the Egyptian Hall, and formed the present semicircular ceiling to that apartment.

The next entry is in 1836, when the steps up to the portico were altered to each end, in two flights, under Sir Robert Smirke, R.A., architect.

In 1842 the lofty attic in front was removed, and the "Ball-room" ceiling formed, but now used as the Supper-room, under William Mountague, Clerk of the Works to the Corporation.

In 1843 the Hall was repaired, &c., under J. B. Bunning, who had succeeded Mr. Mountague. Cost 1,400*l.*

The Doric portico, or side entrance, was put up under Mr. Bunning, who also formed the new Justice-room in 1849.

In or about 1864, and perhaps earlier, arose grave apprehensions as to the state of the foundations. The edifice had been erected on piling covered by oak planking, the site having a marsh-like character. This having been drained by the new sewerage, the timber necessarily rotted. Concrete was put in under the walls during 1865-6, at an estimated cost of 7,500*l.*, of which about 1,000*l.* was saved. The railings in front of the edifice were removed, whereby land was given up to the public of the value of some 15,000*l.* to 20,000*l.* The Egyptian Hall and Saloon were repaired and redecorated at a cost of about 2,850*l.* In 1867-68 redecoration and repairs were effected at a cost of about 3,000*l.* All these works were done under the direction of Sir Horace Jones, who had succeeded Mr. Bunning.

The steps to the front portico were altered to one flight, as at present, about the end of 1851.

These are, perhaps, the main particulars; but the annual cleanings and reparations are not included. I do not know when the upper portion of the State staircase was removed.

The Lord Mayor, Sir Crisp Gascoyne, was the first inhabitant of this excellent building; he took possession of it 1757-58.

A history of the Mansion-House, describing the sculpture in the Hall and elsewhere, as remarked by "E. V.," would be a very acceptable record. I do not see from the Catalogue that there are any drawings by G. Dance of this building in Sir John Soane's Museum, where there is a large number of his drawings. Will "E. V." call and see for himself?

WYATT PAPWORTH.

2, Lupton-street, N.W.

CHRIST'S HOSPITAL COMPETITION.

SIR,—As I have no intention of engaging in the competition for this large new School, I have the less hesitation in endorsing the suggestion of "Kudos," printed in your last week's issue.

It is of the first importance that this building should mark further progress both in school-planning and in school-architecture.

E. R. ROBSON.

KILKENNY WATERWORKS.—The Corporation of the city of Kilkenny, in Ireland, having instructed Mr. W. H. Radford, C.E., to inspect the district, and advise them preliminarily as to the best source for a water supply for the city, he has reported on seven possible sources of supply, finally recommending the Corporation to obtain the water from the mountain streams at John's Well, about six miles from the city. The cost of the works is estimated at 18,000*l.*

The Student's Column.

CONCRETE.—XXV.

CONCRETE FLOORS WITHOUT IRON.

MUCH has been said at different times about the advantages and disadvantages of concrete floors without iron. Architects have been chary of using them because they have had few or no data from which to calculate the thickness required for a given weight and span. Two articles on the subject by Mr. Frank Caws appeared in the *Builder* on July 27 and August 3, 1889, and, after considerable discussion in our "Correspondence" columns, we published a leading article in conclusion. The advantages and disadvantages of concrete floors without iron will be mentioned shortly. Meanwhile, we will consider the strength of such floors, making use of the constants obtained from concrete beams broken by transverse stress, and given in Table XXVIII., Chapter XXI.

The strength of a square plate, fixed at the edges and uniformly loaded, may be calculated from the following formula of Grashof's, where w = breaking-weight in cwt. per square foot, L = length of each side in feet, and T = thickness in feet:—

$$w = 4C \frac{T^2}{L^2} \times 144 \dots \dots (VIII.)$$

This formula is extremely simple, and may be put into a still simpler form, which can be more easily remembered. Let W = the total distributed load; that is to say, $w \times L^2$. We then get:

$$w \times L^2 = 4C \frac{T^2}{L^2} \times L^2 \times 144,$$

which gives us the simple formula—

$$W = 4CT^2 \times 144.$$

In other words, all square plates or slabs of whatever size but of the same thickness, fixed at the edges and uniformly loaded, will carry the same total load. The weight of the slab itself is, of course, part of the load, and consequently as the size of the slab is increased the less does the difference between its weight and the breaking weight become, until ultimately we reach that size of slab the weight of which is more than the actual breaking weight. In such a case, the slab will collapse, by its own weight, as soon as the centres are removed.

The strength of rectangular plates, fixed at the edges and uniformly loaded, may be calculated from the following formula, where B = breadth of slab

$$w = 2C \frac{L^4 + B^4}{L^2 B^2} \times 144 \dots \dots (IX.)$$

Circular plates, of radius R , fixed at the edges and uniformly loaded, may be calculated thus:—

$$w = \frac{3}{2} C \frac{T^2}{R^2} \times 144 \dots \dots (X.)$$

Circular plates, supported at the edges and uniformly loaded, require the formula

$$w = \frac{6}{5} C \frac{T^2}{R^2} \times 144 \dots \dots (XI.)$$

That is to say, the ratio between uniformly-loaded plates fixed and similar plates supported is as 100 is to 80; the ratio between uniformly-loaded beams, fixed and supported, has been already stated to be as 100 is to 86. The ratio for rectangular plates will hover between these two, being practically the same for square plates as for circular ones, and approximating more and more to the ratio for beams as the slabs become more and more elongated.

Example:—Find the uniformly-distributed breaking weight at the age of twenty-one days, of a concrete floor having a clear span of

14 ft. 6 in. by 13 ft. 6 in., and a thickness of 6 in., fixed around the edge; the concrete to be composed of 1 part Portland cement and 4 parts broken brick.

The co-efficient of rupture of such concrete is shown by No. 6 in Table XXIII. (see p. 402, ante) to be 3.11 at the age of forty-three days. The strength at twenty-one days will be about four-fifths of that at forty-three days, i.e., about 2.5. Proceeding by the help of formula IX. we have

$$w = 2 \times 2.5 \times \frac{14.5^4 + 13.5^4}{14.5^2 \times 13.5^2} \times \frac{.5^2}{13.5^2} \times 144,$$

from which we calculate (most conveniently by logarithms) that $w = 1.71$ cwt. Therefore W (the total breaking weight) = $1.71 \times 14.5 \times 13.5 = 334.7$ cwt.

If the weight of the slab itself, which will be about 104.8 cwt. (calculated at 120 lbs. per cub. ft.) be deducted from this, we find that the added load required to break the floor will be 230 cwt. or $11\frac{1}{2}$ tons.

A floor of the dimensions, age, and composition given in this example, but supported at the edges, was actually made and broken by Col. Seddon. It gave way under a distributed load of $10\frac{1}{2}$ tons. If the edges had been fixed, instead of being merely supported, the slab would probably not have broken until a weight of between 13 and 14 tons had been put upon it. This is more than the breaking weight obtained by calculation. But we must remember that great care was taken by Col. Seddon in the construction of the floor; the concrete was well rammed, and was covered with water for seven days after being deposited, in order that the cement might not fail to harden through loss of moisture by absorption, evaporation, &c. We are not told that these precautions were taken by Col. Crozier in the beam from which our constant was calculated.

Very few experiments have been carried out for the purpose of ascertaining the strength of concrete slabs supported or fixed all round. Mr. Potter mentions a balcony having a projection of 4 ft. 0 in. and a thickness of 8 in. at the wall and 3 in. at the free end, which, at the age of eighteen months, bore safely a distributed load of 177 lbs. per sup. ft. The concrete was composed of one part Portland cement to five parts crushed bricks. The test gives a safe-load constant of 1.5, calculated according to formula VII. Mr. C. Drake, in the "R.I.B.A. Transactions 1876," instances a floor "nearly" 20 ft. by 15 ft. by 6 in. (presumably fixed all round), which carried a distributed load of 2 cwt. per sup. ft. without deflection. Assuming the floor to be 20×15 , it gives, according to formula IX., a safe-load constant of 4.74 if the weight of the concrete itself be taken as part of the load, and of no less than 5.92 if the load of 2 cwt. per sup. ft. be, as is probably the case, in addition to the weight of the concrete. Mr. Drake did not state the composition of the concrete.

It is a pity that many results of tests which have been published are lacking in some important particular,—either the thickness or composition of the concrete is omitted, or the position of the load is not defined, or it is not stated whether the slabs were fixed or only supported.

The only experiments, which are worthy of the name, are those carried out by Colonel Seddon in 1874, and given in Appendix I. of his "Builder's Work and the Building Trades" (1886 edition). The following table gives the results obtained by him on slabs supported all round and uniformly loaded with layers of bricks:—

TABLE XXVI.

Tests of Concrete Floors without Iron, by Col. Seddon.

No.	Length between supports. ft.	Breadth between supports. ft.	Thickness. ft.	Age in days.	Breaking weight, in cwt. per sq. ft.	Weight of slab, in cwt. per sq. ft.	Total breaking weight, in cwt. per sq. ft.	Calculated value of C, for slabs fixed at edges.*
1	14.5	6.75	.5	7	3	.54	3.54	5.06
2	"	"	"	14	2.76	"	3.30	5.28
3	"	"	"	21	3.88†	"	4.42	15.07†
4	"	13.5	"	"	1.97	"	1.61	5.81
5	"	6.75	"	14	2.51	"	3.05	4.88
6	"	"	"	21	2.84	"	3.38	5.41

* In calculating the value of C, it is assumed that fixing the edges of slab No. 4, which is nearly square, would increase the strength 25 per cent., and of the remaining slabs 32 per cent.

† This cracked under a load of 61 cwt. per sq. ft., but did not break under the load of 8.88 cwt. per sq. ft., which was the greatest load available for putting upon the slab. Evidently the slab was near its breaking point; its strength is strangely abnormal. Perhaps the bricks, which must have been piled to the height of 7 ft. or 8 ft., were laid to break joint, and formed a flat arch or dome, which, to some extent, relieved the pressure upon the central portion of the slab.

The first four slabs were composed of one part Portland cement and four parts broken brick (to pass a 1 in. mesh); the concrete was well rammed, and was covered with water for seven days. The last two slabs consisted of one part Portland cement, three-fourths of a part sand, and three parts broken brick. Col. Saddon concludes that the addition of sand seems injurious to the strength of concrete. In calculating the strength at twenty-one days of floors carefully made of Portland cement and brick (1 to 4), the value of C may be taken as 5.5.

Arched Floors.—Experiments have been made by Mr. C. Colson with the object of ascertaining the increase of strength due to an arched form. They seem to show that the strength of concrete arches of small rise (not exceeding, say, one-tenth of the span), and with proper abutments, is approximately equal to the strength of a fixed lintel, the thickness of which is equal to the rise of the arch plus the thickness of the concrete at the crown. But the dead weight of the lintel is almost double that of the arch, and therefore the latter will bear considerably more added load than the former. Mr. Colson's experiments were made on arches of the uniform thickness of 9 in., and breadth of 21 in.; some had a clear span of 8 ft. 3 in., and others of 13 ft. 9 in.; the rise of the arch was invariably 9 in.

When arched floors are adopted, they are seldom of the form tested by Mr. Colson, but have usually an arched soffit only, the upper surface being flat. In such cases, the thickness at the crown should never be less than two-thirds the rise. The rise is usually from one-twentieth to one-twelfth the span. Large floors are usually divided into 10 ft. or 12 ft. bays, by means of rolled-iron or steel girders.

Mr. Frank Caws has advocated the use of flat concrete floors with a little cove all round at their bearing on the walls; this gives a slightly domical form to the floor, and increases the strength.

Pro and Con.—The main advantage of concrete floors in large slabs is their cheapness, due to the omission of rolled-iron or steel joists. The chief disadvantage is their liability to give way suddenly and totally under the influence of excessive loads or fires, whereas floors containing iron or steel joists at intervals of 2 ft. or 3 ft. give way gradually and partially. A point in favour of solid concrete floors made of good fire-resisting material, is that the concrete resists fire much better than iron or steel does, and the danger arising from the use of these materials is therefore avoided. Iron thoroughly imbedded in concrete has, however, been found to resist fire admirably.

Floors with Iron, &c.—A few words must suffice about other uses of concrete in floors. The most common method of forming a concrete floor is to fill ironed iron or steel I joists from 4 in. to 6 in. deep, about 2 ft. from centre to centre, and to fill in between them with concrete. The staging under these floors should be kept an inch or more below the bottom of the joists, so that the concrete can pass under these and protect them from fire. Sometimes I joists are used instead of I joists; theoretically the former are preferable, because they supply just as much as the concrete requires, namely, tensile strength, and no more. The upper flanges of the I joists can well be spared, as the concrete possesses sufficient compressive strength without them. Wire ropes, iron rods and bars, and hoop iron have all been used in concrete floors to give them additional tenacity.

Numberless systems of floors, in which concrete is used, have been patented, such as Messieurs's, Allen's, Lunday's, Dawway's, Homan & Rodgers's, Fawcett's, &c., but as they differ from each other in their ironwork or fire-brick lintels, or other features, rather than in the concrete, we cannot describe them in detail. In Fawcett's system, fire-brick lintels are laid between iron joists, but the concrete plays an important part, as it bears directly on the lower flanges of the joists.

Ceilings.—The ceilings of concrete floors are sometimes formed by a thin skimming coat only, but this is liable to fall off if the floor is subjected to moving loads, as the concrete affords little key for it. Sometimes dovetail blocks or fillets are inserted as described for floors, and wood or wire or "expanded metal" lathing is secured to them, on which the plastering can be executed; this makes good work, not liable to crack or fall. Fibrous plaster slabs are well adapted for fixing under concrete floors.

An excellent method of forming concrete

floors which shall have the lower surface perfectly smooth, is that introduced by Mr. Frank Caws. When the wood staging under the proposed floor is in position, it must be covered with a "thin skin of plaster of Paris floated up perfectly level and fair. Upon this . . . a grout of pure cement and water is thinly spread, and upon this grout the concrete proper is cast, and beaten down in the usual manner. The skin of plaster of Paris is perfectly watertight. Not a drop passes through it, and thus the concrete sets more slowly, and to better purpose; and when the centring is eventually removed, the plaster comes away with it, and leaves the concrete solid ceiling smooth and fair, without a blemish or defect."

Frequently floors are formed in a series of arches of small span (say, from 3 to 6 ft.), and the concrete is deposited on corrugated-iron centres of proper curve, the ends of which are supported by girders. These centres are not removed, but form the ceiling of the room under the floor, and can be painted as desired.

OBITUARY.

JOSEPH FREDERIC DEBAEQ.—On November 28 there died, at Boulogne-sur-Mer, the oldest of the French architects of this day, Joseph Frederic Debaeq, born at Paris on May 15, 1806. He was a pupil of Van Clempout, of Perrier, of Huyot, and of the Ecole des Beaux-Arts, but was known more especially by the voyage which he made, in 1827 and '28, in Italy and Greece, in company of the Duc de Luynes, to which he explored the site of the ancient city of Metaponte, the results of the exploration being recorded in a folio volume under the title of "Metaponte," published by himself and the Duc de Luynes jointly, at Paris, in 1833. He also made some interesting discoveries of fragments of painted decoration, one of which he presented to the Ecole des Beaux-Arts. On Debaeq's return to France, where he was many years Inspector des Travaux to the Municipality of Paris, he occupied himself mainly with the work brought him by his connexion with the Duc de Luynes, for whom he built various residences in Paris and its neighbourhood, and designed among other things the funeral chapel for the Luynes family in the church at Dampierre, a work which was carried out in collaboration with M. Charles Garnier, then just returned from Greece. Debaeq was elected, in 1833, a member of the Institut Archéologique of Rome, and since 1841 was a member of the Société Centrale des Architectes Français.

GENERAL BUILDING NEWS.

UNIVERSITY COLLEGE, LIVERPOOL.—On Tuesday afternoon the Victoria Building of Liverpool University College was opened by His Majesty, King Edward. The eastern wing of the building, which adjoins the engineering block, and is separated from it on the ground floor by a wide carriage archway, with a groined roof, leading into what will be eventually the inner quadrangle of University College, contains the Tate Library. The most noticeable feature of the southern elevation is the Jubilee Tower, which rises from the central entrance. On the exterior generally is of ordinary selected local bricks, with red terra-cotta dressings, supplied by Messrs. Clark & Lea, of Wrexham, the modelling being executed by Messrs. Farmer & Brindley. This treatment is further relieved in the library wing by bands of red Russian brickwork. The central entrance leads into a vestibule, which lies within the four walls of the tower, and gives access to the great hall, a large chamber two stories in height, with an apsidal termination at the east end, separated from the staircase by a range of arches, which form a kind of aisle on the southern side. This hall, which is 68 ft. long and 30 ft. wide, is lighted by tall mullioned and transomed windows on the north wall, and is lined with Burmantoffs faience, a material which also forms the mural decoration of the principal staircase. East of the hall, in the portion of the building placed under a large semi-circular theatre, lie the students' common-room and reading-room. On each side of the vestibule are the clerk's and porter's respective rooms, while the long corridor (100 ft. in length) which leads from the hall to the Engineering block, has class-rooms on the north side and professors' private rooms on the south. The first floor, which may be reached either by the principal staircase or by two secondary flights, contains more class-rooms (the largest of which is 43 ft. by 22 ft.), and one or two professors' rooms. Over the archway enters a reading-room, connected with the Senate-chamber, which latter is 27 ft. square. The turret at the south-east corner contains a circular staircase, which does not communicate with the first-floor, but passes on to give access to the upper seats of the theatre. The second floor contains the lecture theatre, which seats 500, and a library. The library is a rectangular room, which extends the entire length of the wing from the great tower to the Walker

Engineering Laboratories, with which it admits of communication through the special readers' room above the western gateway. The full length thus appropriated is 136 ft., while the main rectangle is 102 ft. by 49 ft. The theatre, which is a semi-circle in form, has a radius of 39 ft., and the floor space of the library measures no less than 102 ft. by 49 ft. The entrance to the library is through a vestibule lying just off the principal staircase, in which is placed a bust of Mr. Tate, by Mr. Gilbert, A.R.A. Beyond the library is the librarian's room. The third floor is mostly occupied by the upper part of the library and the lecture theatre. What remains of the story is given up to the requirements of the building, which is fireproof throughout, the floor being of concrete on an iron framework supplied by Messrs. Handyside & Co. The general contractors were Messrs. Brown & Backhouse, and the whole of the works have been carried out under the supervision of Mr. Battye, clerk of the works. Messrs. A. Waterhouse & Son are the architects, the design, which was illustrated in the *Builder* for May 11, 1889, having been prepared by Mr. Waterhouse, R.A., in 1888, from which year the contract dates. Messrs. Hart, Son, Peard, & Co. supplied the electric-light fittings and the metal work generally; Messrs. John King, Limited, did the heating; and Messrs. J. F. Ehner & Alfred Walker were respectively responsible for the masonry and the cement staircases. Mr. Ehner also executed the parquet and wood-block floors. The electric lighting was carried out under the superintendence of Mr. A. L. Taylor; the bells in the Jubilee Tower being supplied by Messrs. John Taylor & Son, Loughborough.

NEW WING, DURHAM SCIENCE COLLEGE, NEWCASTLE.—The foundation-stone of the new wing of the Durham College of Science, Newcastle, was laid on the 5th inst. by the Earl of Durham. The new buildings are to be erected at right-angles to the existing wing, and will equal in bulk the portion first erected about five years ago. In the centre is the Royal Jubilee Exhibition Tower. It is built from the surplus of the Jubilee Exhibition, and comprises a gateway surrounded by four octagonal "sentinel turrets," each 95 ft. in height, and surmounted by ornamental ironwork. The turrets are to be made to serve respectively for (1) chimney, (2) ventilating shaft, (3) experimental tower with a mercury column 100 ft. high for testing gauges, and (4) clock tower and staircase. Above the gateway are the following rooms, all in the tower:—Class-room for general purposes, two private rooms for professors, common-room for art masters, and professors' common-room. On the right of the gateway are the following rooms:—Chemical lecture theatre; six rooms above the lecture theatre, for special and general chemistry; a large class-room, occupying the Mansard roof above the last-mentioned rooms. There is also a boiler room, affording accommodation for two Lancashire and one marine boiler, with measuring tanks and other appliances for the conduct of efficiency and other tests. This is a single-story building, enabling the boilers to be placed quite outside the main building. On the other side of the gateway, on the ground floor, are the following:—Metallurgical laboratory and balance-room, with furnaces adjoining the chimney-shaft; engine and dynamo room, 40 ft. long, 35 ft. wide, and 21 ft. high. Here, also, is the George Stephenson engineering laboratory, 123 ft. long, and 35 ft. wide. On the first-floor are: Lecture-room, 35 ft. square, for metallurgy and other subjects as required, such as building construction, &c.; lecture-room, 40 ft. by 35 ft., for engineering and naval architecture; engineers' drawing-office and model room, 123 ft. by 35 ft. This room will serve as the great examination-hall. The second-floor will comprise the following rooms:—Life class-room, adjoining the art masters' room; art lecture-room, 40 ft. by 35 ft.; and suite of art-galleries, all provided with roof-lights on the north side for the whole length, and measuring 123 ft. by 33 ft., with a clear height of 20 ft. in the centre. The roof principals are constructed of steel with gusset stays. The whole building will be heated by exhaust steam from the main engines, and will be lighted by electricity. The architects of the new building are the late Mr. R. J. Johnson and Mr. Frank W. Rich. The following are the contractors:—Brickwork, stonework, and joinery, Mr. J. E. Middlemiss; steel work for the floor, girders, and roof principals, Messrs. Dorman & Long; plumbing work, Mr. Mansfield Gibson; steam heating, Messrs. Dimmock & Cooke; decorative work, Messrs. Richardson & Co.; plastering, Mr. W. Ferguson; tiling, Mr. C. Nicholson.

CO-OPERATIVE BUILDINGS, LINCOLN.—The foundation-stone of a sub-central store for the Co-operative Society was laid at Lincoln on the 12th inst. The building will have a frontage to the High-street of 65 ft., and a depth from front to back of 66 ft., and will be three floors in height. The ground floor will be divided into three shops. Cellarage is to be provided under the whole area. Staircases of easy ascent are provided to all departments, and ample light will be secured to all floors. The whole building will be heated by hot water at high pressure, and ample lavatory accommodation is provided. A central office is to be provided for the general manager, which will command all departments. An

external hoist will be provided, and a hoist in a central position inside the building communicates with each floor. A roadway will be made to the back of the premises from Tanner's-lane. The front elevation is of Renaissance character; the ground floor will have rusticated stone pilasters and moulded stone cornice. The first floor will be divided into six bays by brick pilasters, and will also have a stone cornice; each of the bays will have a large semi-circular headed window with stone impost, arches, and key-stones; surmounting this will be a terra-cotta parapet, divided into panels bearing the name of the Society, with stone coping. The cost of the work will be about 5,000*l.* The contractors are Messrs. Wright & Sons; the clerk of the works for the brickwork is Mr. C. Robinson, and for the woodwork Mr. Panton. The whole of the work has been designed by, and will be carried out under the supervision of, Mr. J. H. Cooper, architect.

CHANCEL, ST. PAUL'S CHURCH, BEDMINSTER, BRISTOL.—On the 23rd ult. the consecration took place of the new chancel of St. Paul's Church, Bedminster. The work was commenced in April. The chancel is 29 ft. in depth, with an organ-chamber on one side and a vestry for the clergy on the other, with accommodation for the choir in an apartment beneath. The work is in the Early Perpendicular style. The floor of the chancel is formed of polished marble. Mr. E. W. Barnes, of Bristol, is the architect, and Mr. George Humphreys is the builder.

NEW POLICE-STATION AT NEPSFEND, YORKSHIRE.—A new police-station at Nepsfend, situated at the corner of Burton-road and Hicks-street, has just been completed. The main elevation, which is towards Burton-road, is carried out in pressed red bricks, with stone dressings, and is broken up by two gables, one of which is above an arched gateway leading into the parade-ground. The buildings consist of a charge-office and search-room, with two cells, and lavatory and closet accommodation for officials and prisoners. There are also two dwelling-houses for police-officers abutting upon the station-yard, but the charge-office, cells, &c., are so arranged as to be self-contained, and completely shut off from the dwelling-houses, as well as from the adjoining street. Further cell accommodation can be added when required. The buildings have been designed and carried out by the Borough Surveyor and his staff at a cost of about 1,550*l.*, the contractors being Messrs. Walker & Slater, of Derby.

RESTORATION OF BOURN ABBEY CHURCH.—The reopening, after restoration, of Bourn Abbey Church took place on the 5th inst. The restoration has been effected at a cost of about 1,400*l.* Mr. Traylen, Stamford, and Mr. Shilcock, Bourn, were the architects, and Mr. Roberts, Stamford, the contractor.

MISSION-HALL, & C., KENSINGTON.—The rebuilding of St. Mary Abbots Mission-hall and Infants School, for the Hon. the Rev. E. Carr Glyn, M.A., will shortly be undertaken. The infant school will be built according to the requirements of the Education Department, and the plans have been approved. The architect is Mr. T. Phillips Figgis, A.R.I.B.A.

PROPOSED TECHNICAL INSTRUCTION SCHOOL FOR STAMFORD.—A scheme has just been published by the Technical Education Committee for the borough of Stamford for the erection of a technical school in the town. The plans have been prepared by Mr. J. C. Traylen, a local architect, and show that the proposed building would have a frontage to Broad-street, the site being the Shambles. The plans provide for an upper room, about 50 ft. by 18 ft., with movable partitions, well lighted to the north; while below are shown two rooms (one on each side of the entrance), a staircase, lavatories, &c.

NEW PORCH AND BAPTISTERY, MANCHESTER CATHEDRAL.—According to the *Manchester Guardian*, one of the last important works of the Manchester Cathedral restoration, the erection of the new south porch and baptistery, may now be considered as practically completed. The porch is outside of Darley Dale stone, from the Derbyshire quarries of the late Sir Joseph Whitworth, and of Carlisle stone inside. The design is in accordance with the general architecture of the church. In the interior of the baptistery the pavement immediately surrounding the font is of Roman mosaic. At the four angles are panels representing the four Evangelists. Outside this panel the baptistery is paved with dove, red, black, and white marble. The font, which formerly stood near the north entrance to the nave, has been removed to the new baptistery. The marble pavement, mosaics, &c., in the baptistery have been executed by Messrs. J. & H. Patteson, Manchester, who have also, we are informed, executed the marble and mosaic flooring throughout the building.

CLOCK, COPT HEWICK, NEAR RIPON.—Mr. Joseph S. Hurst, J.P., of Copt Hewick Hall, having offered to erect a clock-tower in the village at his own cost, Messrs. Poits & Sons, of Leeds, have been commissioned to supply the clock, which will have four dials, illuminated at night, and having also a bell for striking the hours.

SANITARY AND ENGINEERING NEWS.

SEWERAGE, NORTHALERTON.—The North-alerton Local Board of Health have adopted a scheme of main sewerage for the drainage of part of the town and the County Prison, according to plans prepared by Mr. D. Balfour, M.Inst.C.E., of Newcastle-on-Tyne.

SEWAGE DISPOSAL AT SALE.—The Local Government Board has now approved of the scheme prepared by Mr. A. G. McBeath, Surveyor to the Board, for the purification of the sewage of the township, and given its sanction for the borrowing of the money, about 19,000*l.*, necessary for the purchase of the land and the execution of the various works. The plans were submitted to the Local Government Board in 1890, in order to meet the requirements of the Rivers Pollution Act, as pointed out in a circular issued by the Manchester Ship Canal Company. The system to be adopted for the purification of the sewage is one of precipitation and filtration, the precipitation being effected by the ferrozone, and the filtration by polarite filter beds under the International Water and Sewage Purification Company's process. The effluent will flow into the Mersey by gravitation. The sludge will be treated so as to form manure. The site of the works is near the Bridgewater Canal. They will cover an area of 5½ acres, but the total area to be acquired for sewage and other purposes is 15½ acres, leaving ample room for extension hereafter if necessary.

POLLUTION OF THE YEO.—The Wincanton Rural Sanitary Authority having been threatened with an action for alleged pollution of the Yeo, near its source, by the discharge of sewage from the town of Milborne Port, without proper treatment, called in Mr. A. P. J. Cotterell, C.E., of Bristol, to advise them upon a better system of disposal. His report was considered by a Vestry meeting at Milborne Port, and was unanimously passed, and having since received the approval of the Sanitary Authority, instructions have been given to proceed. The sewage will be treated with ferrozone just before reaching the existing outfall tanks, whence, after deposit, the effluent will be carried in pipes to the Henvor Meadows. Here 16 acres of ground will be prepared for irrigation, the ground being deep-ploughed, and the surface formed into panels or divisions for intermittent filtration, and the purified water will thence be conveyed to the stream.

STAINED GLASS AND DECORATION.

FOUR-LIGHT WINDOW, WEDMORE CHURCH, SOMERSET.—The parish church of Wedmore, Somerset, has just received a memorial window consisting of four lights from the studios of Messrs. Mayer & Co. The subject selected for treatment was an illustration of the forty-ninth chapter of Genesis, and comprises Jacob and his twelve sons, with women, &c., in the background.

WINDOW, PARISH CHURCH, BRENT KNOLL, SOMERSET.—The east window of the Parish Church of St. Michael, Brent Knoll, Somerset, has just been filled with stained glass. The three principal lights are occupied by three Archangels. St. Michael is represented in the centre with a spear, in the act of treading upon and piercing the dragon; St. Raphael, in the character of a pilgrim, while St. Gabriel, bearing the Lily of the Annunciation, and the first words of his message, "Ave Maria," on a scroll, occupies the chief place in the third compartment of the window. Under these are represented smaller accessory figures in medallion panels. The design and execution of the work have been carried out according to the instructions and specifications of Archdeacon Fitzgerald by Messrs. Wailes & Strang, of Newcastle-upon-Tyne.

MEMORIAL WINDOW, MANCHESTER CATHEDRAL.—Another memorial window is just completed in Manchester Cathedral, being the new four-light window on the south side of the recently-erected baptistery, at the west end of the nave. The new window, which has been executed by Messrs. Percy Bacon & Brothers, of London, consists of four lights, the subject treated being the Saviour in the act of blessing little children.

FOREIGN AND COLONIAL.

FRANCE.—At the close of the recent Ministerial crisis M. Charles Dupuy, deputy of the Haute Loire, was nominated Minister of Public Instruction and Fine Arts, in place of M. Bourgeois, who has become Minister of Justice. M. Antonin Prost has just resigned his post as General Commissioner of Fine Arts in the French section of the Chicago Exhibition. He has been replaced by M. Roger Ballu, General Commissioner of Foreign Artistic Exhibitions. M. de Baudot, architect, has just commenced his course of French architecture at the Trocadéro Palace, on the Moven Age and Renaissance. This course is to be in two parts, 1st, studies of character in the different periods of French architecture, forms and methods of structure; 2nd, methods to be followed and means to be employed in restoring historical monuments.

The fine portrait of M. Alphonse, by the painter Roll, is to be placed in the Hôtel de Ville in the hall of the Commission of Roads and Streets. A large and curious mosaic, found at Vienne, in Dauphiné, representing the occupations of man during the different months of the year, has just been placed in the Louvre Museum, in the Hall "des Prisonniers;" around this mosaic are to be arranged the *Saisons*—"Pedagogue," the Bordeaux sarcophagi, and the Arles Faun. Thus the ancient Gallic sculptures will all be grouped in one part of the Louvre. A commemorative monument, erected by the Société des Souvenirs Français, has just been inaugurated at Domont (Seine and Oise) to the French soldiers and sailors who have died for their country. The society of Fine Arts of Carcassonne will open their first exhibition on January 1. A few days ago a great fire destroyed the Hôtel de Ville at Langres, which contained the public library, the archives, the magistrates' court, and the tribunals. Nothing has been saved. The Financial Committee of the Senate, who were appointed to examine the project relating to the rebuilding of the Opéra Comique, have concluded to adopt it, as it has been voted by the Chamber, in spite of the protests of the architects against it. The same committee have rejected the Bill to give up the grounds of the old Cour des Comptes to the Central Union of Decorative Arts. The Company of the Chemin-de-Fer de l'Ouest are proposing to establish a bridge for the line of Belbec-Pont-Audemer, crossing the Seine to the environs of Quillebeuf. This bridge will be more than 200 metres long, and will be raised more than 50 metres above the level of the sea. The same company have just built a fine metal bridge over the Seine for the line from Paris to Havre, at the place called "Le Manoir," near Rouen.

The death is announced of M. Edouard Charles Weyland, Government Architect-Surveyor of the Court of Appeal, and member of the Société Centrale. M. Weyland, who was fifty-four years of age, was the son-in-law of M. Duphot, the eminent Bordeaux architect, who died a few years ago. We have also heard of the death, at the age of eighty-two, of M. Francois Jules Favre, honorary architect of the Department of the Haute Saône, and Chevalier of the Legion of Honour. M. Favre, who was a pupil at the Ecole des Beaux-Arts under the direction of Henri Labrousse, entered very early into notice, and carried out several important works in Paris. He was for thirty-two years architect of the Haute Saône, where he executed many large works. He belonged to the Société Centrale since 1848. M. Dumont, President of the Société Centrale, has forwarded a letter from M. Charles Lucas to the Minister of Finance, asking for the restoration of the bust of the eminent architect of the Hôtel des Monnaies to its old place of honour on the grand staircase of this palace. The jury for the competition of the first class of architecture at the Ecole des Beaux-Arts has awarded the first medals to MM. Delort, Gaillet (Tony), Fille, and Javary, and second medals to MM. Bouvier, Debat, and Evrissaint. The old palace of the abbé de St. Germain des Prés is being restored. It was built in 1589 by the Cardinal de Sourbon, and was the scene of the massacres of September, 1792. It is now occupied by numerous scientific societies.

BERLIN.—The subject for the Schinkel Medal Competition of 1893 will be a club-house, a novelty for German architects, as clubs are not a feature of German life. Berlin, in fact, can only boast of three respectable clubs, of which two have their own houses. Competitors would do well to cross the Channel and study English club-houses, especially as their "sending-in-day" is quite a year hence. The long-expected Berlin "Suburban" Building Act was published on Monday, and proves to be a highly-interesting piece of building legislation. Much attention has been paid in it to questions of sanitation and fire-risks. The new Act wars us of an approaching "Great Berlin." The invaluable Royal Prussian testing-station at Charlottenberg has again been of great service to architects during its past year. About a thousand different materials have been reported on, and these reports were based on some twenty thousand tests. Of the thousand different materials, eight hundred were either natural or artificial stone.—The Berlin telephone system is to be greatly extended. Nine provincial townships are now to be connected with the capital.

MESSRS. JAMES STIFF & SONS.—In consequence of the misleading terms in which the notice of Mr. James Stiff's retirement appeared in some of last Saturday's papers, we are asked to state that the dissolution of partnership between J. Stiff, W. Stiff, and E. Stiff, trading under the name of James Stiff & Sons, London Pottery, Lambeth, S.E., is simply the formal notice of the retirement of Mr. James Stiff, which occurred in the year 1876, in accordance with the provisions of the partnership deed. The business has been, and will be, carried on in the same style by the same two remaining partners, who have had the entire management for the last twenty years.

MISCELLANEOUS.

THE EGYPT EXPLORATION FUND.—The sixth ordinary general meeting of this Fund was held on Wednesday afternoon, Mr. E. Francis Thompson, of the British Museum, in the chair (in the absence of the President (Sir John Powler). Mr. Charles Dudley Warner was elected an Honorary Vice-President for America, in the room of the late Hon. G. H. Curtis, and Mr. R. S. Poole was elected Honorary Secretary, in the place of the late Miss Amelia B. Edwards, whose death to the work of the fund was highly esteemed. Satisfaction was expressed that the Fund had now convenient central offices at 37, Great Russell-street, Bloomsbury. The financial report of the Honorary Treasurer, Mr. H. A. Grueber, for 1891-92, which was then read, showed that the finances of the Fund were in a satisfactory condition. The total expenditure for the year 1891-92 had been 2,474. 15s. 6d., including (1) for Mr. Naville's expenses connected with his excavations at Tmei-el-Amidd, Baghlio, and Tell Mokdam, 365*l.* 17*s.* 1*d.*; (2) for Count d'Hillst's work at Behbeit-el-Hagar, 537*l.* 16*s.* 10*d.*; (3) for the transport of the sculptures found at Amnas in the provinces of the Nile, to their several destinations in England, America, and Australia—351*l.* 7*s.* 6*d.*; (4) for the costs of the capital of the column from Amnas, which were presented to the British Museum—9*l.* 16*s.*; and (5) for the survey fund—681*l.* 19*s.* 2*d.* The total receipts for the same period had been 2,673*l.* 15*s.* 1*d.* The report was adopted, and Mr. Griffith was thanked for the report. Mr. Powler, the Chairman, said that the society now numbered 1,500 members, which showed the vastly-increased interest which was now taken in the history and antiquities of Egypt. The secretary, Miss Paterson, then read her report, in which, after referring to the excavations accomplished by Mr. Griffith had been engaged in preparing the manuscript and plates of the two volumes of Bani Hasan for the Press, and it was hoped that the first volume would be issued in a few weeks. The very fact that Mr. Newberry brought back some 14,000 square feet of tracings would give some idea of the time required to prepare them for the press. The site of Tmei-el-Amarna and the tablets which adjoin it would provide material for this season's work, and promised results of peculiar interest, both historic and artistic. The report was adopted, and Mr. Naville then gave an interesting account of his investigations at Tmei-el-Amidd.

BRITISH ARCHEOLOGICAL ASSOCIATION.—At the meeting of this Association on Wednesday, the 7th inst., Mr. C. H. Compton in the chair, Mr. Woods exhibited a fine and perfect vase, of Roman pottery, recently found at Colchester, with other objects of the same age. Mr. Earle Way described a collection of relics, mostly of Roman date, which have recently been found at Bankside, close to the site of the Clute-Amarna, and the tablets which adjoin it would provide material for this season's work, and promised results of peculiar interest, both historic and artistic. The report was adopted, and Mr. Naville then gave an interesting account of his investigations at Tmei-el-Amidd.

Mr. Sherraton forwarded for exhibition a bronze cast of early form, found at Llandudno. Mr. J. P. Fritchett described the Early carved bosses in the choir of Selby Abbey; and Mr. Curtis (Ward & Hughes) gave a description of his restoration of the beautiful stained glass in the east window of the church. It dates from about 1380, the subject being the Root of Jesse. All the recently discovered glass has been replaced, the window, however, the stained glass is open to doubt, there can be none but that some sort of station existed here. Mr. Loftus Brock, F.S.A., exhibited a fine specimen of stamped bookbinding, contemporary with the volume which was printed at Leyden in 1482.

APPOINTMENT UNDER THE BUILDING ACT.—The District of Stoodrich and the Liberty of Norton Folgate has been conferred on Mr. Henry Lovegrove, District Surveyor of South Islington. It is

a curious fact that the amalgamated district contains three Vestry Halls.

THE PREMATURE PUBLICATION OF COUNTY COUNCIL REPORTS.—We trust that the London County Council will make haste to rid itself of the suspicion that it harbours a parasitical section, calculated, before long, to bring it into bad repute. We desire to call attention to what seems to be nothing short of a public scandal. We say this advisedly, notwithstanding the impression in the public mind of the immaculate attributes of the average County Councillor. A daily paper has, thanks to the inability of some member or members to observe the unwritten but recognised law that reports of committees are "private and confidential," been enabled to print the full text of such reports two days before the meeting of the Council. The enterprise of the proprietors, to whom such fish is valuable, is commendable, but the action of the parties who supply the "copy" needs only to be mentioned that it may be condemned. The practice has now grown to such an extent that the proceedings of the committees, although closed to the Press, become public property in a few hours. Some of this information is undoubtedly of value to the public, but the majority of it must be, and is, given by the members themselves. If the Council is to be honeycombed with men who have seats upon it for the purpose of adding to their incomes by the betrayal of confidential documents, then good-bye to purity of administration, for so long as the nightingale lays its eggs in the nest, it is proof against the blandishments and bank-notes of persons who desire favours at their hands. We do not care to what political party these parasites may belong: the poorest members may be the most honest; but the Council must, if it is to live, be purged of those members in whom confidence is an unknown quantity. Let the public journalists be sought with gold. It is of no use to mince matters; a blow must be struck, and we hope the Council itself will deal with the scandal in a vigorous fashion.—*Local Government Journal.*

"LEIGHTON'S CHIMNEY-COWL."—We have received from the patentee particulars and illustrations of Leighton's "Smoke Preventer Chimney-Cowl," which would be found useful for certain cases of smoky chimneys, but which, like many other patented articles, possesses, as its distinctive feature, a positive detriment to its efficiency. A horizontal tube revolves on a spindle and points in the direction of the wind, but the inventor has spoilt his work by the introduction of a cone of aperture within the tube under the impression that he is thus adopting the principle of the injector of a steam-engine. The mistake lies in forgetting that the injector uses a small amount of steam at high-pressure to do certain work in a convenient way, whereas in a cowl there is a large amount of steam, which is the cause of the smoke. The way of doing this in cowls of this type is by a trumpet mouth to the tube itself, in which the inventor has been anticipated.

JUNIOR CONSTITUTIONAL CLUB.—We understand that the decorative work on the front of this building was modelled and carved by Mr. Gilbert Soale.

RESTING PLACE OF ROBERTS OF COPPING HAYES.—In Copenhagen, as in most other Continental cities, regulations are in force to the effect that no dwelling-houses must be taken possession of until "perfectly dry." This term, of course, very elastic, and it is, therefore, proposed to establish a central office where the moisture of a building may be ascertained, and certificates of "perfectly dry" issued. The normal dryness, i.e., the limit of fitness for occupation, is to be not above 2 per cent. of water in the mortar, and in order to ascertain this, samples of the latter are taken by a specially-constructed tester in all layers of the building. These samples are carefully ground, placed in jars, closed hermetically, weighed, and finally placed in a double-sided vacuum of copper. Under a heat of 100 deg. Celsius the process of drying will be effected in from half to one hour, and the moisture may then be ascertained by weighing the sample anew when cooled; and by taking the average of the moisture in all samples the humidity of the whole building is ascertained.

STREETS AND PAVEMENT IN GLASGOW.—The *Glasgow Evening Citizen* of the 6th inst. reports that the Police Commissioners of Glasgow have given permission for an experiment to be made with a street-paving material that is at any rate new to Glasgow. Hitherto, granite, whinstone, and wood have been almost exclusively used in the formation of the city thoroughfares, and now a trial is to be made of a special prepared brick, known as the Omoa fire-clay brick. These bricks measure 9 in. by 3 in. by 5 in. The experiment is to be made in Buchanan-street, in that part which is above Sauchiehall-street, leading to the Buchanan-street station, where the traffic is abnormally heavy. The bricks will be laid on a good sound foundation, and everything done to make the test a fair one. The danger of water percolating between the seams and cracking the bricks in time of frost, we are told, "to be obviated by the insertion of thin slips of wood between the blocks, over which cement will be spread, so that the bricks will be flush with each other on the surface level, and perfectly waterproof." It is further stated that, unlike granite setts, the bricks will not wear smooth, but will

always have a rough facing, and thus have a good footing for horses. It is also proposed to pave a portion of Gordon-street, where the traffic is lighter, in a similar manner. On the question of cost, it is stated that these brick pavements can be laid at from 3*s.* 6*d.* to 4*s.* 6*d.* per square yard.

ELECTRIC LIGHTING IN SOUTHPORT.—At the Southport Town Hall, on the 8th inst., Colonel John Ord Hasted, R.E., held an inquiry on behalf of the Local Government Board into an application by the Southport Town Council for sanction to borrow 28,000*l.* for the purpose of electric lighting. The Town Clerk (Mr. J. Davies Williams) opened the case for the Corporation, who propose to put down generating plant on land adjoining the gasworks at Crowlands, on the outskirts of the town, and to lay two high tension trunk cables, one to the business part of the town, and one to the Heekath Park, or more residential part of the borough, connecting the two by another line along Albert-road and Lord-street. The system to be adopted had not been definitely decided upon. Evidence was given by Mr. W. Wilkinson, M.I.E.E., and Electrical Engineer to the Corporation, and Mr. J. Booth, Gas Engineer. There was no objection to **COLOR COPIING.**—We have received from the Colour Copying Co., of Broad-street House, E.C., particulars and examples of a new process of rapidly producing copies of coloured plans or mechanical drawings or maps, which must be executed in a certain medium sold by the Company, and from which two or three dozen impressions can be rapidly taken off, giving the colour of the original a good deal fainter, but still so clear as to be practically useful. A plan of a house, for example, is reproduced in a few minutes, with the distinguishing colours of red for the brick walls and yellow for the partitions quite sufficiently distinct for practical purposes, and from thirty to forty such reproductions can be made from one drawing. The important point of course is, whether the colouring media and the ink to be used are satisfactory to work and likely to be permanent, which latter is sometimes an important matter in the case of working drawings. If satisfactory in that respect, the process would certainly be useful where several repetitions of a plan or map are wanted in a short time; and the cost of the process is trifling.

LEGAL.

A SCHOOL BOARD ARBITRATION CASE.

In February last Messrs. W. H. Lorden & Son, builders and contractors, Trinity-road, Upper-Tooting, S.W., brought an action against the School Board for London for the sum of 400*l.* 5*s.*, being the balance of 75 per cent. of an account of 4,131*l.* 13*s.* 4*d.* (300*l.* having been previously paid), leaving a total net balance of 3,131*l.* 13*s.* 4*d.*, for alterations in a house in Battersea Park-road, in forming new entrance and drainage, &c., to the "Letchmere" schools, which action was, by the consent of the parties, referred to arbitration. The President of the Royal Institute of British Architects appointed Mr. Charles Barry as arbitrator, who, after nine meetings at the Surveyors' Institution (in which Mr. Pollard appeared for the plaintiffs, and Mr. Boyle for the defendants) and one meeting on the site, gave his award on November 29 as follows:—"As to the plaintiffs' claim for 460*l.* 5*s.*, being the balance of the 75 per cent. of the value of the work done and materials supplied, subsequently by the consent of the parties increased to 313*l.* 13*s.* 4*d.*, being the full amount of the balance claimed to be due in respect of said work done and materials supplied, I award and adjudge that the defendants do pay to the plaintiffs the sum of 745*l.* And as to the defendants' claim for compensation for delay, I further award and adjudge that the defendants have no claim or demand against the plaintiffs with respect thereto. And I further award and adjudge that there are no matters in difference in reference to the said works between the parties other than those with which I have hereinbefore dealt. And I further award and direct that the defendants do pay to the plaintiffs their costs of and incidental to the reference, and the costs of the plaintiffs, and that the defendants do bear their own costs of the same."—(Communicated.)

MEETINGS.

FRIDAY, DECEMBER 16.
Architectural Association.—Mr. F. Inglo Thomas on "The Formal Garden." 7.30 p.m.

SUNDAY, DECEMBER 18.
Sunday Lecture Society.—Dr. Percy F. Frankland on "The London Water Supply,—a scientific answer to a popular question." 4 p.m.

MONDAY, DECEMBER 19.
Royal Institute of British Architects.—Professor Atchison, A.R.A., will read a paper by Dr. William Dargfeld, F.S.A., Hon. Corr. Member, on "The Hypætrah Temple." 8 p.m.
Surveyors' Institution.—Mr. E. Tidman on "Sanitary Ventilation." 8 p.m.
Leeds and Yorkshire Architectural Society.—Social Evening, 7.30 p.m.

SALISBURY.—For the erection of a book-factory and office, for Messrs. Moore Bros. Mr. Alfred C. Babbage, architect, Salisbury. Quantities by the architect:—
 H. Bull £2,880
 Cockerell 5,760
 Shubert 9,488
 Beeby 2,136
 Light 9,218
 Denkin 3,195
 Young Bros. 9,100
 Cowles 9,887
 Quick 2,988
 Hale 8,888
 Hall 8,880

SHIPLEY (Hants).—For pavilion, chancel, &c. Shurley and Willbrook, for the Local Board. Mr. H. J. Weston, A.M. Inst. C.E., Surveyor, Local Board Office, Shipley, Hants. £190 0 0
 J. W. Roe & Co., Southampton (accepted) 155 0 0
 (Surveyor's estimate, £ 85.)

SOUTHEND.—For the erection of residence at Southend-on-Sea, for Mr. J. Brown. Mr. Edward Wright, architect, Southend-on-Sea. £1,100 0 0
 Rodwell 1,251
 Edmunds 1,087
 Drake & Son 1,197
 Dupont 1,041

SOYLAND (near Halifax).—Accepted for taking down "Lower Barn" Moor Farmstead, and building new farmhouse, barn, stable, &c., former quarry site and building face walling. Mr. T. L. Patchett, architect, Halifax.
 Eriey, Brickwork (exclusive of old materials) £490 0 0
 (Copper and Lead) (exclusive of old materials) 94 15 5
 Plumber and Glazier (exclusive of water supply) 8 5 0
 Stone and Plinths (exclusive of old materials) 25 0 0
 Total 548 0 5
 Estimated total cost, £705.

STORNOWAY (N.B.).—Accepted for constructing, &c., portions of harbour works, for the Pier and Harbour Commissioners. Mr. Alexander Macdonald, Engineer, Stornoway Harbour, N.B. Quantities supplied:—
 E. C. Becher, Edinburgh £1,600 0 0

SURBITON (Surrey).—For the erection of a pair of semi-detached villa residences in St. Andrew's square, Surbiton. Mr. H. L. L. Moore, architect, 100, Queen Victoria street, E.C., and Surbiton.—
 Ewins & Co. (accepted) £1,323
 J. H. Jarvis 1,323

TUDHOR (Durham).—Accepted for laying out, making roads, and other works at Rural Ground for the Rural Board. Mr. J. Henry, architect, 11 North Bailey, Durham.—
 W. & E. Blackett, Bishop Auckland £1,127 6 0

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Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY, but those intended for the front page should be in TWELVE noon on WEDNESDAY morning.

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The London County Council and Fair Wages.



HE recent debates in the County Council have practically left unaltered the main principle which the Council decided to adopt last May, namely, to give the workman what is considered fair wages, whether the work

was done directly by the Council or indirectly through a contractor. The last discussions have arisen in regard to the manner of fixing such fair wages. The contention of those who opposed the recommendation of the Fair Wages Committee was that under it Trades Unions would be able to exact any rate of wages which they pleased. The object of Mr. Frederic Harrison's amendment was to limit the wages to the rate actually obtained by members of Trades Unions. It is some consolation for the ratepayers of the Metropolis that the recommendation of this Committee was limited to some extent by the adoption of Mr. Harrison's amendment. The debates, however, were chiefly interesting for the light thrown on the views of the Council and on the divisions which this question is obviously beginning to cause. Mr. Hood Barrs, the chairman of the Committee in question, observed, in the course of his speech on the second day's debate, that the clause, as amended by Mr. Harrison, "would afford no assistance to those trade unions that were weak and helpless, and could not obtain their terms, however reasonable, from their employers." In other words, the chairman of the Committee looked at the matter not from the point of view of those whose interests he was elected to safeguard, namely, the inhabitants of the metropolis generally, but from the point of view of the workmen who are to do the work for the inhabitants of London. It is, of course, right that workmen for a fair day's work should get a fair day's wage, but this is a matter which unions and combinations of workmen can get for themselves. The persons

who purchase the labour are not their protectors. It would be interesting to know whether Mr. Hood Barrs, who is a solicitor in London, ascertains whether the men who copy the deeds and documents which he sends out to his stationer obtain what he regards as a fair rate of wages; whether he makes any stipulation that these copyists, men generally far worse off than the ordinary manual labourer, shall be properly paid. He would probably say that it is a duty which he owes to his clients to get the work done for as little as possible. The fact is that there are a certain number of members of the County Council who appear to have lost all just perception of the duty of representatives.

We stated also that light was thrown on the divisions which this subject is beginning to cause in the Council. Sir John Lubbock and Sir Thomas Farrer, both liberal and large-minded men, are both opposed to the views of the majority of the Council. They represent clear-headed liberalism, and it is certain that in the long run their views will prevail, even though for the moment less sound opinions are the most powerful in the Council. The extraordinary want of business perception in the majority of the Council is shown by the fact that they have decided to give trades-union rates of wages, not only when they do work for themselves, but when they employ contractors, and that they have decided to do without the latter in a large number of cases, and to be their own contractors, if it is permissible to use such a phrase. The ordinarily sensible and prudent Town Council is satisfied to make the best bargain it can with a contractor, and to see that it gets good work for its money. Lord Rosebery recently spoke in favour of the amalgamation of the City with the rest of the metropolis. Until greater prudence characterises the work of the County Council, the public and Parliament will do nothing towards this end. On the contrary, it is possible, if the present management of the County Council raises the rates,—that a cry will arise that London be divided into certain districts, which shall manage their own local affairs.

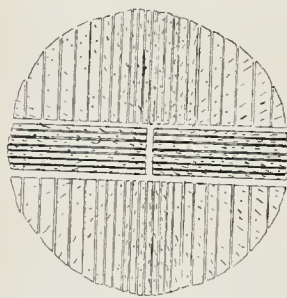
STRUCTURE AND PROPERTIES OF OAK.



N the oak family, botanists enumerate a large variety, but the definitions in many cases are so fine that it may be said many are so closely related to each other that for some practical purposes a large portion will admit of being grouped, and the present object fully served by passing over some of the minor distinctions in botanical nomenclature, as it is the physical conditions of the wood that constitute a difference in manufacture; and especially must this view be taken when it is considered that woods of the same species differ very considerably in quality. Therefore, a personal and practical knowledge is required to ascertain correctly the value of any difference that may present itself, and to acquire this a minute inspection should be made of the structural arrangement and the texture of the wood, as seen in the ends of logs or boards, &c. In oak of the highest quality in strength and durability, it will be found that the vascular tissue or pores are limited to one line in each concentric ring, and the cell tissue that is mixed with the wood in the rings occupies but a small space in proportion to the amount of wood, which is of a compact and dense nature, consequently less liable to have those concealed defects which are common in logs that have two or three lines of vascular tissue to each concentric ring, and the cell-tissue in about equal proportion with the lignine. It may be here stated that oak with one line of vascular tissue to each concentric ring is seldom met with, while that with two or three lines of pores to each ring is frequently found. But the quality of the wood does not so much depend on one or two lines of the tissue as it does upon the quantity and distribution of the cell-tissue which is intermixed with the wood contained in the rings. On the extent and state of this tissue the quality of the wood should be determined; that is, with all those well-known characteristics that point out in a more conspicuous way the general

condition of the wood. Therefore, special attention requires to be given to the texture of wood, and to form a correct estimate of the quality of an oak log or billet before it is converted into planks or boards, a minute examination of both ends of the log or billet should be made, and the distance apart of the vascular tissue or pores situated at the edge of each concentric ring carefully noted, also the quantity of cell-tissue, and the proportion this tissue stands in to the wood in the rings. In selecting logs for the purpose of converting them into boards suitable for work that requires to be light in colour, with a rich appearance in the silver grain or figure, the examination is restricted to the ends of the logs or billets, where if the wood be light in colour it will appear as a bluish grey, and the state of the silver grain or medullary ray can easily be distinguished radiating from the centre to the circumference as thin white lines. On the state of these lines will depend the quantity of figure in the wood, and to make a correct estimate of them the logs, &c., must be examined in cross section, as logs with a close resemblance on the sides indicate a decided difference in the ends. In all cases the colour of the wood and that of the ray or silver grain should be carefully noted, as a light and dark shade will be found in trees of the same species, but this not unfrequently proves serviceable in panelling and framing, to use the light shade for panels and the dark shade for stiles, or *vice-versa*. By a judicious arrangement of the wood in which the silver grain is conspicuous, an effective surface can be produced; but as the number of boards that can be had from a log with this figure fully developed is very limited, it is well to consider carefully the thickness they should be cut to. The reason of the number being so restricted is that the medullary rays radiate in a direct line from the centre to the circumference of the log, and it is only those boards that are sawn out parallel with the rays which as figured wood will be most perfect. In a number of boards taken out of a log, even if it is first cut on the quarter, the ray will be situated obliquely in many of them without in any way adding to their appearance, or giving but a faint indication of being present in them.

To cut a log on the quarter implies that it be first cut into three fitches or parts, and to take a log 29 in. or 30 in. in diameter, the thickness of the fitches should be respectively 7 in. and 11 in.; the central part 7 in. and the two outside parts 11 in. each. The centre of the middle fitch, which contains the heart, is generally defective and requires to be cut out, as it is unsuitable for manufacturing purposes; thus making the central fitch into two parts, which, with the two sides, constitute the four quarters. In converting the fitches into boards, the two central parts should be cut the deep way and in direct line with the ray. By cutting in this way, each board taken from them will



Transverse Section of Oak Log cut on the quarter. Dotted lines show the ray or silver grain in the wood, and the boards in which figure will be conspicuous on their surface.

show the silver grain in its most perfect form (see diagram). In dealing with the side

fitches, and to insure the greatest number of figured boards from them, they require to be cut at a right angle to the face line, or the side which had been sawn when opening the log, and here it will be observed that it is only those boards that are taken out of about 7 in. of the immediate centre of these fitches that have the silver grain fully showing on their surface. In a large portion of the wood on either side of this no appreciable indication of this grain will be given, on account of the angle at which it is situated to the line of the saw-cut, so that these portions will be of less value as ornamental wood, except to give variety and effect to those parts which display the silver grain. By converting an oak log into boards in this way the greatest amount of workable wood is realised with the least possible waste, and the highest number of boards that have the silver grain fully appearing on their surface, as each fitch will give seven boards, $\frac{3}{4}$ in. thick, allowing $\frac{1}{4}$ in. for waste in each saw-cut. The boards taken from the central fitches will give a breadth of 1 ft. 2 in., and those from the side fitches an average breadth of from 10 in. to 11 in.

The oaks that are principally in demand at the present time in British commerce and manufacture, viz, British oak, Russian and Prussian oak, Austrian oak, and American oak, differ from each other so far that it is important to possess a complete knowledge of each. In the early history of this country native oak occupied a prominent place, and it still continues to be in this position amidst the many varieties of oak annually imported to meet the requirements of the present advanced state of the various industries that demand a particular kind or quality of wood. In British oak it will be observed, as previously stated, that the characteristics which distinguish the highest qualities are one line of pores to each concentric ring, and the cell tissue little more than discernible to the unassisted eye; but oak of this description is seldom met with at the present time, as doubtless it had been largely drawn upon during the period of the "wooden walls," and the foresters of that day must have acted on the motto,—"slightly altered,—sufficient for the day is the supply thereof." Nevertheless, a large portion of British oak that is at present available contains the elements of strength and durability.

The primary conditions essential in the structural arrangement in oak of the best quality consist in a close combination of the fibres, small pores, and comparative absence of cell tissue in the lignine. Oak that combines these characteristics with a fresh and clear unmixed colour, straight-grained, and free from twist or defective knots, is well suited for beams or columns that are required to bear heavy strains, and it is also specially fitted to resist the influence of deleterious matter in whatever position it may be placed. In choosing lengths for columns, beams, or scantlings, an examination of the end furthest from the butt should be carefully made, as the state of the texture of the wood will be inferior at this end to that at the butt end. Therefore to judge the strength of beams, &c., by observation, the structural conditions of the ends furthest from the butt must be taken as the gauge of the strength of the column beam, or scantling. In a log of British, or any, oak, 21 ft. long, conditions in the vascular and cell tissues will be found that will indicate three grades of strength in this length, and if the log be cut into three equal parts, of 7 ft. each, this may be proved by the state of the texture which appears in the cross sections of these parts. The first 7 ft. from the butt, if of a good quality of wood, will have an average of six concentric rings to the inch, with the cell tissue in the woody portions of the rings comparatively limited, and a specific gravity, when thoroughly seasoned, of about 940 oz. to the cubic foot. In the second or central 7 ft. the specific gravity will be about 860 oz. to the cubic foot, and the average number of concentric rings to the inch will be about ten, with an increase of the cell tissue in the woody portion of the rings, and the

third 7 ft. or top portion of the log will have an average of about fifteen concentric rings to the inch, and a specific gravity of 830 oz. to the cubic foot, with a considerable increase in the quantity of cell tissue in the wood of this portion compared in the first 7 ft., or butt end of the log. This difference in density in the three lengths will be found to be a cardinal point in estimating the strength and durability of the wood, and as the difference in the specific gravity of the three portions of the log, so is the difference in the relative state of the lignine, cell tissue, and vascular tissue; hence the difference in strength and durability. And in making a selection for beams that are required to bear heavy strains a minute examination should be made of the relative state of the tissue and the woody fibre; for, however suitable the wood may appear on the sides of the beams, the true state of the texture can only be ascertained by making a correct and thorough examination of the ends, and a careful investigation in this way when selecting oak for columns that are required to support a great weight is even more important than in selecting for beams, as in columns the pressure is nearly equal throughout the entire length, and to the full extent of their diameter. Beams or columns may be taken out of a log with the greatest care to avoid imperfections, such as the immediate heart wood, which has become over aged, consequently brittle, and the alburnum or sap wood, which is not sufficiently matured, but a safe conclusion regarding strength must be based upon the texture of the wood in the end that gives the least quantity of lignine to tissue, as this is the weakest part and the first to give way under pressure, and to rely exclusively on a given constant for the breaking strain would be to ignore the natural laws that govern wood.

Russian and Prussian Oak.—The ornamental figure, or silver grain, peculiar to oak is not generally so prominent in British oak as it is in Russian, Prussian, Austrian, and American oak. In Russian and Prussian oak the fibre is fine, straight, and hard, with a firm combination in the grain of the wood, and in colour it is frequently of a light tone. The figure, or silver grain, which in many instances is much lighter and of a shifty shade, gives lustre to it. A good selection of this wood will sustain a high finish, and it is well suited, on account of its light colour, for cabinet work or joinery. In examining in cross-section logs or quarters of logs of this wood it will be discerned, in those that are rich in figure, that the lines of the medullary ray are fine, and closely situated at regular distances from each other. "Dantzig oak" is a term that is frequently applied in the retail timber trade in all the oak imported from Riga, Memel, Dantzig, and Stettin, from the contiguity of these ports to the forests from which the wood is taken; and although situated in two countries, the difference in the general quality of the wood is hardly appreciable in a practical sense, except that occasionally very superior-grained and figured wood is imported from Riga, while many of the Stettin shipments are slightly inferior. The principal features in Russian and Prussian oak are the fine quality of the fibre and figure, and firmness in texture, yet it will be observed that the pores, although small in diameter, are numerous, but the small proportion of cellular tissue renders it the most suitable oak for the manufacture of furniture, and in some cases for joinery, when a close, hard grain is required.

Austrian Oak.—In Austrian oak, the pores and cell-tissue make up about three-quarters of each concentric ring, but the close combination of the woody fibre renders it moderately hard, tough, and strong. The grain is frequently found to be straight, and when converted into boards, those that are cut in line with the silver grain are richly marked, and well suited for wainscoting, &c. In selecting logs of this wood that are to be converted into boards for special purposes, it will be necessary to make a careful examina-

tion of the ends to ascertain the relative state of the tissue, fibre, and medullary ray, as a considerable variety may be met with in a small number of logs.

American Oak.—The oak imported from America into this country as Baltimore, or Quebec, or red oak, will be found in weight, when thoroughly seasoned, considerably less in proportion to volume, and decidedly inferior in strength to British oak. This may be accounted for by the large amount of cellular tissue that is intermixed with the fibre, and the comparative width in the diameter of the vascular tissue, all of which gives to this wood a soft and spongy nature that exclude it from structural work where high degrees of strength are required. But to apply this description to all the oak that is imported into this country from America, in log form, and in a semi-manufactured state, would not be in keeping with the characteristics which, to a certain extent, have placed what is commercially known as American white oak in competition with British oak. The quality of the white oak is in every respect much superior to the red oak. In structure and weight, after being thoroughly seasoned, it compares favourably with British oak. It is light in colour, and in some instances the fibre is so fine that it closely resembles Austrian oak. In structure it resembles British oak, but it has not the same rigidity and elasticity; but where pliant, tough, and durable wood is required, American white oak of good quality is in every respect suitable.*

NOTES.

IN the discussion on Dr. Dörpfeld's paper at the Institute Mr. Penrose observed that he did not think sufficient justice had been done to Mr. Fergusson's theory of the lighting of the Parthenon, and in one sense this is the case. The ingenuity with which Mr. Fergusson worked out a method of lighting the temple, which was perfectly possible constructively without interfering with its exterior effect, was most remarkable; but he had not a shred of evidence, either literary or in the way of architectural fragments, to support it; it was simply a theory. Further consideration has convinced most students of architecture that there was no need for this elaborate contrivance, and that the temple could have been lighted sufficiently for their purposes from the open door; and we do not think this conclusion is likely to be disturbed in future. The result shows the danger of evolving theories of architectural construction out of one's inner consciousness. We do not understand why Dr. Murray represented the English critics as having generally accepted the hypothetical theory of the Greek temples. In the earlier part of this century it was so, but, as far as we know, the idea has been for many years abandoned by all who have any right to an opinion.

MR. BALFOUR'S address at Manchester this week on the subject of technical education did not throw any fresh light on the subject from a practical point of view. It was, however, useful for emphasizing the fact that the country is now committed to a system of technical education, and that it cannot draw back. It is true that that system is very imperfect, and that the objects are frequently much misunderstood. There is too much of an impression abroad that technical education is merely what may be termed "workshop teaching," whereas in truth it should be education in the basis on which technical work rests. We do not want to make a number of amateur carpenters and carvers, to take a homely instance; we wish to make those who are carpenters and carvers by trade more skilful. As Mr. Balfour points out, we have to face increased foreign competition,

and technical education is intended to assist the workmen of this country in their competition against foreign rivals. It was by no means amiss, also, for Mr. Balfour to point out that technical education can never be an education in itself. The dignity of labour, to use a cant phrase of the day, is all very well, but the mind requires something broader than this mere imparting of technical knowledge.

THE London School Board, after a good deal of arguing and cross-voting, has finally come to the decision to institute an open competition for a school for 1,200 children, showing means of enlargement for 1,600, "capable of being erected on any ordinary site purchased by the Board." In further discussion it was resolved that premiums of 150*l.*, 100*l.*, and 50*l.*, be awarded "at the discretion of the Assessor" (who is to be the President of the Institute of Architects for the time being, or any one whom he may appoint); that the premiated plans are to be the property of the Board; that "the Board do not bind themselves to employ the successful architect in the erection of the school," and that the designs be accompanied by general specifications and reports showing the system to be recommended for heating, ventilation, and drainage, and by an alternative plan showing arrangement of one hall for the three departments, subject to and in conformity with the regulations of the Education Department. The competition is not, upon these lines, any very great temptation to architects, and we do not think the Board will find that any architects of eminence will trouble themselves about it. As it stands, as the plans are to become the property of the Board, and they are not bound to employ the successful competitor, it simply resolves itself into a competition to procure new ideas for the Architect's department of the Board. But the most absurd thing of all is the determination to have a competition for no fixed site, a competition for a school in the air, as it were. For various reasons, we should have thought that a determination to employ outside architects on some at least of the schools was to be commended (though, as we have already said, the official architect of the Board ought to have the position of consulting architect); but it should have been a competition for a definite school on a definite site. The first thing any architect who is worth the name wants to know, when called on to plan a building, is the nature, position, lighting, &c., of the site; that is what in a great measure determines his plan; and to put up a competition for an ideal school, irrespective of site, will prove little more than wasting the Board's and the architects' time, as well as the ratepayer's money.

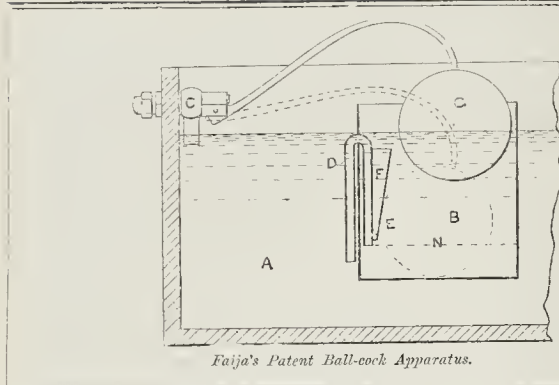
IT is stated in the course of a special article which appeared in the *Times* last week on the subject of railway rates, that if things "shake down," on the basis of the present revision, the railway companies stand to lose a considerable portion of their revenue. This, it is remarked, will be a consequence of too liberal treatment in the past,—low actual rates having been adopted by Parliament as the standard in fixing maximum rates. As a number of the new rates are now open to public inspection at the various stations, traders will soon be able to judge how far this alleged loss of the companies is their gain; but we doubt if their experience will tend to confirm the estimate alluded to. As far as we have been able to learn, a considerable proportion of the new rates correspond with the authorised maximum charges, no margin whatever for contingencies being thus left. On the other hand, a number of old-standing special rates are retained, which are generally below the statutory limit. Still no loss of revenue can be said to be involved in the retention of existing rates, however low; and it is where the old rates are perforce reduced in order to bring them within the Parliamentary limit that the com-

panies will feel the pinch. The writer of the article referred to assumes that the latter will outweigh the advances, although he goes on to anticipate a lot of indignant protest on the part of disappointed traders and Chambers of Commerce against the changes which have been made. These opinions are expressed in language which bears some resemblance to that employed by Mr. Acworth in his article in the current number of the *Nineteenth Century*, and dissatisfaction is prophesied with a certainty, which carries with it a conviction that the writer is not prepared to say that it will be altogether without justification. As far as the working classification is concerned, there is little, if any, difference between it and the Parliamentary Classification; and we notice that no provision whatever is made for reduced rates for traffic conveyed at owner's risk. It is to be hoped that this is one of the matters not yet settled, for, if the owners' risk regulations are to be swept away it will be a very serious matter for many trades. In the scale for "small" the companies have exerted their full charging powers at the outset, and will probably not lose much after all by the reduction of the "small" limit from 500 lbs. to 3 cwt. It appears that the effect and intention of the Order we alluded to last week is really to exempt the companies from giving publication in detail of the January alterations, being in fact a temporary suspension for two months of the Order directing such publication. After March 1 the publication, as prescribed by the original Order, will again be compulsory; and extracts from the rate-books will be furnished on application during the interval,—probably without charge to regular customers, though a charge is announced at the rate of 6d. per 50 rates quoted.

THE September volume of the "Transactions of the American Society of Civil Engineers" contains a paper entitled "Wind-bracing in High Buildings," in which the writer points out that, although architects vary considerably in their individual practice while agreeing collectively upon main principles, yet in such lofty structures as the increasing value of land calls upon them to design, they generally adopt walls of thick section, and floors composed of heavy-rolled joists, with or without columns, which are merely supported or fixed at their seatings without any bracing; and the author advocates, as a preferable system, a more developed form of construction with the use of an elastic material, consisting of built-up and braced members composing a skeleton framework, to be subsequently filled in, as required for walls and partitions. While naming 40 lbs. per square foot of exposed surface as a maximum unit wind pressure necessary to provide for, he draws attention to the fact that the wind sometimes develops an energy exceeding average measurements, and that a building of great height, even with a good breadth, can better sustain the effect of shocks, when formed of continuous framework, which admits of efficient bracing, than it can when the usual more solid forms of constructions have been adopted; more particularly if the structure happens to be built upon a yielding foundation or to be isolated in position or subject to vibration, due to the running of heavy machinery, which tends to loosen the hold of the floor upon the walls. Among other papers in the volume we find one which states various records of rainfall, its flow and storages in America, and a useful, practical paper upon "Roofing Slates," in which the writer points out the necessity of investigating both the chemical analysis and the geological aspects of the slate-quarry.

IN his last four-weekly report (November 6 to December 3) on the sanitary condition of Kensington, Dr. Orme Dudfield refers to the fact that the Board of Works of St. Giles's district have recently addressed a communication to the Board of Trade in regard to the inadequate capacity of the water-closet

* To be concluded in our next, when we will give also some photographic reproductions of sections of various oaks, taken from the actual wood.



Faija's Patent Ball-cock Apparatus.

service system allowed by the water company (two gallons), requesting the Board of Trade to take steps "with a view to the 21st regulation being altered so as to provide for the use of cisterns or service-boxes which will permit of a discharge of not less than three gallons of water at each flush." The St. Giles's Board have also sent a copy of their letter to the several sanitary authorities, asking them, if they agree with this view, also to address the Board of Trade on the subject. It is almost needless to say that so efficient a medical officer as Dr. Dudfield entirely concurs in the objection to this inadequate supply of flushing water, to which we have also called attention some time since. It is not merely that the two gallons is inefficient to properly flush the closet; it is a question also of proper cleansing of the house drain and securing the rapid and efficient carriage of solid matter into the sewer; and to stint water for such a purpose is leaving an extra probability of the fouling of drains. Dr. Dudfield believes that some of the water companies are of the same opinion, and do not exercise their legal power of objecting to a three-gallon flush; but it is most desirable that the regulation should be amended and the power of thus improperly curtailing the water-flush be no longer left as an anti-sanitary weapon in the hands of the water companies.

An improved ball-cock apparatus has been invented and patented by Mr. Faija, the well-known engineer, who has kindly allowed us to bring it before our readers. The object of it is to obviate the disadvantage arising from the constantly-diminishing flow of water from the ordinary ball-cock as it approaches its closing point. The manner in which this is effected will be understood from the diagram, coupled with the following quotation from the specification of the patent:—

"In the diagram, A is a portion of the cistern or tank into which it is desired to regulate the flow of water or other liquid, and B is a separate vessel which may be placed either inside or outside the tank A, in which the ball G rises and falls, actuating the tap C, by which the cistern A is filled.

D is a siphon by which the water or liquid is drawn out of B, into the cistern A.

E is an air-escape hole surrounded by the open vessel F.

The action of the apparatus may be thus described. The cistern A being empty, the vessel B will also be empty, or nearly so, and the ball will be in the position shown by the dotted lines; the tap C will be open, and consequently the cistern A will be filling gradually, but no liquid will flow into B, until such time as the liquid or water in A has reached to about, or above, the top of the siphon D, and until this desired level is reached the tap C will be full open; when the liquid has reached this level however, it will commence to flow through the siphon D, which, in this instance, acts only as a condenser, quickly filling the vessel B, which is of small relative capacity, and thus the ball G will be raised, and the tap C closed, when also the vessel F, surrounding the air escape hole, will be filled. As the cistern A is emptied the vessel B will remain full, and the tap C, therefore, closed, until such time as there is sufficient difference in the level of the water or liquid in the two vessels

for the siphon to start, and as the vessel B will then be full of water, the air escape hole E will be sealed, and consequently the vessel B will be emptied to any desired level below it, as, for instance, to the dotted line N. The vessel F, which may be emptied by the air escape hole E, or by perforations in its lower portion, or by both, will by this time be empty, and the air escape hole E unsealed. As the cistern A fills, the water or liquid rises in the longer leg of the siphon D, and the air in the siphon is forced out through the air escape hole E, thus allowing of the flow of liquid from the vessel A into B to commence when this desired level in A has been reached, which flow will continue until B is full, and the tap C closed as already described."

We have long thought that the action of the ordinary type of ball-cock was capable of improvement so as to secure full running up to the moment of cutting off the water, and the object is here attained in a very neat and scientific manner.

THE trustees of the Spanish and Portuguese Synagogue Charity are willing to grant an eighty years' building lease, at the annual rent of 350*l.*, of two parcels of land in St. Katharine Coleman parish, City. On the one piece, containing about 1,000 square feet, now stand Nos. 9 and 10, Jewry-street; the other, about 4,000 square feet, lies at the back, and consists of Cock-court, with the nine almshouses which for some time past have appertained to the Charity. By the entrance into the court is No. 7, one of the last remaining of the old gabled houses in the street, which until about 100 years ago had retained its pristine name of Poor Jury-lane, as having been occupied mostly by Jews. The court itself is that described in Strype's edition (1720) of Stow as "Holsey's-rents, very small and ordinary." South-west of the court lies Northumberland-alley, which displaced some dicing-houses and bowling-alleys that had been set up in the gardens of the house of the Earls of Northumberland, who lived there in the fifteenth century. Next beyond was the Coleman-haw, or garden, which gave a name to the church. This latter, which it has been proposed to demolish, escaped from the Great Fire, and was rebuilt, at the parishioners' cost, in 1734. It is thus described by the late George Godwin, in his "Churches of London," 1839:—

"The fabric as it now stands, . . . is quite undeserving of illustration, except as serving as an evidence of the improvement which has taken place in public taste. It may be confidently stated that no parish in the metropolis would now allow such a piece of ugliness to be erected. It is built of brick, and has rusticated dressings of stone around the windows and doors. The interior presents merely a plain room with a flat ceiling coved at the sides, ornamented by one large oval panel with a flower in the centre. The altar-piece stands within a circular-headed recess at the east end, and is quite plain.

AS an addendum to our "Note" of last week, it may be as well to call attention to the fact that when Mr. Tate's new gallery is erected on part of the site of the old Penitentiary at Millbank, the land will be reverting to one of its former uses, for it was here that the head of the Grosvenor family, during the last century, laid the foundation

of that noble gallery of pictures which is now the chief ornament of the Duke of Westminister's house in Upper Grosvenor-street. It is also not a little remarkable that Lord Ebury (better known, perhaps, by his former title of Lord Robert Grosvenor) has lived to witness the commencement of the demolition of the Penitentiary, though he was born at "Millbank" when it was his father's town house in the first year of the present century. In the parish church of St. John, hard by, is a mural tablet recording the fact that in 1800 King George III. and his Queen Charlotte stood within its walls as sponsors in person at the baptism of Lord Ebury's elder brother Thomas (afterwards Earl of Wiltour). The house inhabited by the Grosvenors at Millbank was built in 1735, on the site of old Peterborough House, which figures in one of Hollar's views of London.

THE "Journal of the Franklin Institute" for November contains among other articles a paper upon Ship Canals, in which the author cites a few examples as a comparison for a projected work. His paper treats the subject from a financial point of view, and does not describe construction, but we allude to it, because we entirely endorse the great importance he attaches to the provision of ample depth of waterway.

THE Goldsmiths' Company, as trustees, are prepared to grant an eighty years' building lease, at 385*l.* per annum, of the site of four houses, Nos. 13-6, Little New-street, Shoe-lane (south side). The lessee is to covenant that he will spend on the erection of new houses a minimum sum of 7,000*l.* within twelve months after Midsummer-day, 1896, when the existing leases of Nos. 13-5 will expire. The ground covers about 3,000 ft. superficial, having north and east frontages to Little New-street and New-street-hill, respectively. The property, consisting originally of six houses, was devised in 1652 by Francis Ash to the Company, conditionally upon their paying 20*l.* annually to the town of Derby, and making certain payments to their officers and pensioners. Close by, in the middle area of New-street-square, is McLean's-buildings, which occupies the site of the old tenements, pulled down in 1852, of which T. H. Shepherd's two water-colour drawings are in the Crace collection, and which after the Great Fire succeeded some property bequeathed to the Company by Agas (or Agnes) Harding in 1513. In 1824, Thomas Harding gave them 2,396*l.* Consols, and 3,000*l.* Reduced Annuities. These, and Sir James Pemberton's bequest of 200*l.*, in 1613, are commemorated by the names of East and West Harding-streets, and Pemberton-row (*præter* Three Leg-alley), in this same quarter. The Goldsmiths own most of the property round about New-street-square; their coat-arms are affixed to several of the houses, and are carved on two stones; the larger bearing also the date, "1670;" let into the wall of the footway descending from the square into Robin Hood-court. We are informed that most of the buildings which form Messrs. Eyre and Spottiswoode's premises occupy sites belonging to the Goldsmiths. The house, being No. 10, in Little New-street, where Dr. Johnson, Warburton, Robertson, Hume, and others, used to visit William Strahan, who bought, in 1770, a share of Eyre's patent as King's printer, stood by the corner of Printer-street. No. 10, with its garden, and Nos. 11-2, were demolished about twenty-five years ago for Messrs. Eyre & Spottiswoode's binders' warehouse, which adjoins Nos. 13-6 mentioned above.

ACORRESPONDENT sends us a characteristic piece of information as to the value set upon a competent surveyor's assistant in some places. Seeing an advertisement in a widely-circulated North of England paper that an assistant was required in the office of the Borough Surveyor in a

large manufacturing town, he applied for particulars, which were as follows:—

1. To draw plans and sections as is usually required in a Surveyor or Architect's office.
2. To take, and reduce levels, and plot on plan and set out when required.
3. To attend one or two meetings at night during each month.
4. To sketch, report to Surveyor, and superintend any works.
5. To act generally under the Surveyor's instructions.
6. Salary 52*l.* per annum.
7. The person appointed must reside in the borough.

As our correspondent observes, comment on this is superfluous.

WE are entirely in sympathy with most of the views expressed in Mr. Thomas's paper on "Formal Gardens" at the Architectural Association, but we must protest against his contemptuous manner of dismissing Repton as one of a set of bunglers of the same class as "Capability Brown." Repton was a very able man, and on a far superior level to Brown, and a great many of his hints and criticisms are admirable, from whatever point of view we regard the subject.

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

THE HYPÆTRIAL TEMPLE.

The fourth ordinary general meeting of this Institute for Session 1892-3 was held on Monday evening last at Conduit-street, the President, Mr. J. Macvicar Anderson, in the chair.

Four gentlemen were nominated for election as Fellows, nine as Associates, and one as Honorary Associate.

The Institute of Architects of New South Wales.

The President said he wished, with the permission of the meeting, to move a resolution in reference to the alliance of another Society with the Royal Institute of British Architects, viz., the Institute of Architects of New South Wales. The matter had been before the Council for some time, partly owing to circumstances which it was not necessary to mention further than to say that amongst a certain number of their colonial friends there appeared to be some slight want of unanimity. The time had, however, now come when the Council considered that they were justified in recommending that the application for alliance should be granted. He would, with the permission of the meeting, read the petition which the Institute of New South Wales had sent. [The President here read the petition.] That was the first application which they had received for alliance with a society outside the United Kingdom, therefore they were proposing a new departure. He had the greatest possible pleasure in proposing that the Institute of Architects of New South Wales be admitted to alliance with the Royal Institute of British Architects, because the Institute of New South Wales had done all that lay in its power during the last few years to maintain a high standard of professional character in the Colony. Their paper on professional practice, which had been published in the *R.I.B.A. Journal*, was a highly commendable document, and a perusal of it would show that the Institute of New South Wales was worthy of every recognition and support which alliance with the Royal Institute could bestow upon it.

Professor Atchison seconded the motion, which was carried unanimously.

The Hypætrial Temple.

Professor Atchison then read a translation by Mr. Gill of a pamphlet by Dr. William Dörpfeld on this subject. The following is an abstract of the paper:—After briefly summarising the violent disputes about the question of the existence and form of the hypætrial temples, and the diametrically opposed views thereon, as exemplified in the opinions of L. Ross and C. Bötticher, the author expressed his opinion that recent excavations had completely settled the point. Mr. Penrose's excavation of the Olympion at Athens showed that that temple was octastyle, and thereby a new light was thrown upon the description of hypætrial temples given by

Vitruvius (iii. 1). On that passage had been based the opinion that the Parthenon at Athens and the temple of Zeus at Olympia were hypætrial temples, and from that it was deduced that all the peripteral temples similar to these, with an interior order of columns, were hypætrial. By way of showing that that view was untenable, the author proceeded, first, to note the chief arguments used for and against the existence of hypætrial temples. It was argued that the cells of many temples could not, from their size and from architectural reasons, have received the necessary light from the door, and so a top light must be taken for granted,—though opinions differed as to the shape of this opening: wholly uncovered nave (K. F. Hermann); a small opening in the centre of the cella (C. Bötticher); openings of various shapes and sizes over the aisles (J. Kergusson). To that argument, and its assumption as to the amount of light needed, it was answered that although the light entering through the door of a cella could not have lighted up the interior in the way necessary for a modern museum, yet such an amount of light was neither necessary nor aimed at. The impression produced by the statue would only gradually be perceived by those entering, after they had accustomed themselves to the semi-obscurity. Some details of the chryselephantine statue were perhaps not distinguishable at all; but it did not follow from that the door, as a source of light, became impossible. In the similar case of the sculptures on the exterior of temples,—for instance, the pediment and frieze of the Parthenon,—no one had deduced from the fact of their elaborate details (and even partly on their rear) that they could not possibly have been placed so high up on the temple. That the illumination from the door was, moreover, not so small as people usually supposed, was shown by J. Durm's tabulated statement of the proportion of the door-opening to the area of the cella of several Greek temples; to which must be added the consideration of the greater brilliancy of the Greek sunlight as compared with that of this country. 2. To the argument from the existence of altars in the interiors of temples,—that an hypætron was needed for the escape of the smoke from sacrifices,—it was answered that sacrificial altars were generally in front, and not in the interior, of temples; and that ceilings blackened by smoke were not by any means considered unsightly. 3. The author rejected the argument from certain finds which had been deemed to indicate the existence of a skylight in the roof of some temples: such as the curb stone found near the temple of Aegina, and the tiles with round openings near the temples of Olympia, Phigaleia, Tegea, and Athens. These tiles were used for the lighting of the roof, at least in those temples whose roof was accessible, and when it was not thought desirable to put a window in the pediment. We had, therefore, no certain bodily proof for the existence of an hypætron in a Greek temple. Nor had the defenders of the hypætrial temple laid any great stress upon the arguments indicated above. They had mainly based their theory upon the passage in Vitruvius. That passage, however, had now received, through the excavation of the Olympion at Athens, an interpretation totally opposed to the one that it had hitherto received. The author discussed the passage, its *various lectiones* and different exegeses, and proceeds to show that whereas it was for philological reasons only that the new editors of Vitruvius had edited the passage so as to show that he only named a single example of an hypætrial temple (viz., the octastyle temple of Olympic Zeus at Athens), the late excavations had shown how right they were. It was now demonstrated that the Olympion was octastyle, and not decastyle as had been commonly held; and every reason for believing that the "octastylus" of Vitruvius was the Parthenon had disappeared. The result of that demonstration was decisive for the author's argument. They were neither entitled to hold the Parthenon nor the Zeus temple at Olympia as hypætrial temples, nor could they admit that the majority of peripteral temples with an interior columation were lighted hypætrially. Secondary arguments had now become unnecessary; and those who still wished to hold by their views in favour of hypætrial temples had the onus of producing positive proof that ordinary peripteral temples must have been lighted from above. It was not denied that the

hypætrial temple did exist; but the temples which received their light through the ceiling were exceptions compared to the great number that were only lighted from the door. The author enumerated these exceptions, and pointed out that we should probably regard the cella of some of them as an open space surrounded by a colonnade and a wall, while around this enclosing wall was placed still another single or double colonnade, according as the exterior was intended to appear as a peripteros or a dipteros. At the time of Vitruvius, moreover, the Olympion was probably not in a complete state, while after the completion of the temple by the Emperor Hadrian the cella might probably have lost its hypætrial source of light. Some hypætrial temples, too, were those of gods who had to be worshipped in the open air. The author's conclusion was that though a few great dipteral hypætrial temples existed, the Greek and Roman temples had as a rule no light from above, and were only lighted from the door.

The President said that the paper dealt with a subject of great interest, and he was glad to say that there were one or two gentlemen present who were specially competent to speak upon it. He was glad to see present Mr. Penrose, and Dr. Murray of the British Museum. He would ask Mr. Penrose to open the discussion.

Mr. F. C. Penrose said he had listened with great attention to Dr. Dörpfeld's paper. The Doctor had been kind enough to send him a copy of his pamphlet, and Mr. Gill's translation conveyed his views perfectly. In regard to the substance of it, he (the speaker) agreed in almost every point with Dr. Dörpfeld, with some slight exceptions. He thought, however, that Dr. Dörpfeld had not done entire justice to Mr. Fergusson's theory of the lighting of the Parthenon. But perhaps, before coming to the Parthenon, and in order to clear the ground (although Dr. Dörpfeld had already done that), he would say that in his opinion the Parthenon and the Temple at Olympia were quite out of the running, and the whole interest of the question of the lighting of hypætrial temples, so far as the remarks of Vitruvius went, rested with the Temple of Jupiter Olympus at Athens. But he wished to say that it was his belief that other temples had upper lights, though perhaps they were very small, and were covered by single tiles. These openings were, of course, not so considerable as the clearstory windows which Mr. Fergusson proposed for the Parthenon. It was quite possible, as Mr. Fergusson had said, that two tiles might have been taken up by such openings, and those openings would have let a glimmer of light into the cella of the temple; because, when the door was shut, the light in the temple would be very small indeed,—almost extinct, in fact. The great object in those temples, other than the hypætrial ones, was to admit the early morning sun. The great festivals, and perhaps the worship, were at sunrise, and the temples were so orientated as to allow the sun to shine right into the door and along the naos of the temple. Therefore, in the early morning, there was an abundance of light entering through the door into the interior of the temple, although later in the day, of course, the amount of light so entering would be greatly diminished, and it would be insufficient to allow of the interior of the temple being clearly seen. So much, then, for the ordinary temples, where the light was admitted mainly by the door, as Dr. Dörpfeld had explained. But then came the question raised by the passage in Vitruvius, which was a very interesting one indeed, and one upon which the work carried on by the Dilettante Society at Athens had thrown considerable light. He held that Stuart and others who held the decastyle theory were thoroughly justified in their views by the then conditions. The passage in Vitruvius said that the hypætron was like the dipteros, except that it was lighted from the roof, the roof being open to the sky; therefore it followed as a natural inference that the hypætrial temple ought to be decastyle. He thought that the ingenious solution proposed by Wilkins was very happy from a literary point of view; he suggested that *decastylus* was a misreading, and that the letters *asty* formed part of *decastylus*, which was intended to mean the great temple in the city, which was distinguished from that on the Acropolis. "There

was no example of that at Rome, but there was an example of it at Athens in the town." Excavations made during recent years on the site had shown that the Temple of Jupiter Olympius at Athens was octastyle, and not decastyle. Referring to a section of the Temple which was exhibited on the screen, Mr. Penrose pointed out what he after Fergusson, conceived to be the position of the hypæthrum, Fergusson supposed, on the authority of a coin bearing a representation of the interior of the temple, that the temple was covered with a kind of wagon-vault, panelled or otherwise ornamented, and that the light was admitted by a great window at the east end of the wall. It so happened that on the very day of the great Olympian festival, viz., April 19 or 20, the sun in its course in the early morning shone straight through that window and on to the very place where the great chryselephantine statue was known to have stood. That circumstance was strongly confirmatory of Fergusson's theory that there was a large opening at the east end which could be closed by curtains when the weather was bad. From the passage in Vitruvius it might be supposed that the naos was open to the weather, but that could hardly have been so; the statue must have been protected from the weather. He had the greatest pleasure in expressing his agreement, in the main, with Dr. Dörpfeld's theory about the hypæthral temples. The great temple at Branchida, mentioned in M.M. Rayet and Thomas's work, appeared never to have been completed.

Dr. A. S. Murray, Keeper of the Greek and Roman Antiquities in the British Museum, said he had very much pleasure in seconding the vote of thanks. He was there as a learner at the feet of men like Mr. Penrose and Dr. Dörpfeld, and he had listened with the greatest interest to the discussion, and in particular to the very vigorous reply which Mr. Penrose had made to Dr. Dörpfeld. They all admired Dr. Dörpfeld intensely, but they knew that he was not being very thorough-going, and he thought that archaeologically we in England had generally held to the hypæthral temple. He did not know why, but we were a practical people, and we read a little, and we had come to that conclusion. In considering this question they could not afford to ignore the *lacunaria* of the colonnades in Greek temples, which were frequently found to be pierced with square holes in the centre, and afterwards covered on the top by separate slabs of marble, decorated with a star, or in some such way as to suggest that in olden times an embroidered curtain had been drawn over these openings when the sun was too strong or the weather too rough. It had been thought that something of the same sort might have been extended into the cella; but probably archaeologists were wrong on that point. Pausanias, in speaking of the Heraion at Olympia, said that a little before his time, when the roof of the Heraion had fallen into decay, and it was determined to repair it, they found the body of an armed man in his armour between what he called the sloping roof that supported the tiles of the temple and the roof which was meant to be ornamental, apparently the horizontal ceiling. Pausanias conjectured that the man had been wounded while fighting from the roof of the temple, and that he had crawled between the roof and the ceiling and there died. It was possible that he might have pulled off some of the tiles on the roof of the temple and crept in, but it seemed to him (Dr. Murray) that possibly there might have been some clear-story arrangement which would have enabled a man to get between the roof. He mentioned the point once to Mr. Fergusson, who said that he would cite it in favour of his clear-story view. He had great pleasure in seconding the vote of thanks to Dr. Dörpfeld.

Mr. Wyatt Papworth said he wished to say a few words about the tiles which had been mentioned, and he wished to call attention to a paper read by his brother, in 1866, entitled "Suggestions respecting the Roofs of Temples called 'Hypæthral.'" His brother was the first to call attention to the subject, and to suggest that the roofs of the temples of Egina and Bassæ were covered with such tiles. The word "tiles" had been used, but as we only know tiles 10 in. by 6 in., or so, in London, it should be mentioned that the "tiles" of the Parthenon were 2 ft. 3 in. square, whilst the tiles of the temple of Epicurius, at Bassæ, were 3 ft. 6 in. by 2 ft. 1½ in., and 1½ in. thick. Few remains of such "tiles" existed. There was in the British

Museum a small tomb, on the roof of which were openings similar to those which had been described, and there were other examples mentioned in the paper referred to. Mr. Fergusson, in his last book, had used two or three examples showing that mode of lighting. If these tombs were formed in imitation of the hypæthral temples it would carry out to a great extent the idea of the perforation of the tiles.

The President asked what was the material of the tiles?

Mr. Papworth said they were of marble. There was a passage in Pausanias in which Byzes of Naxos was mentioned as the inventor of such tiles. That system of roofing got to Athens, where the tiles became much improved. He was rather inclined to form his own notion that the temples were lighted partially in that way, and not altogether through the doorway; although he was very much impressed with a passage which he read in some writer with regard to the temple of Abou Simbel, where, one morning in the year, the light of the rising sun passed through the doorway, and lighted up the figure at the extreme end of that very long tomb. He thought that neither the author of the paper, nor Professor Aitchison, had quite impressed upon them the passage in Vitruvius referring to hypæthral temples, which clearly stated that the temple was "open under heaven," which, in his judgment, meant that there was a clear space right up to the sky. Some authors had tried to show how that opening could be covered in a few minutes in the case of rain, and how the statue could have been protected from intense heat.

Dr. Murray desired to add a word with regard to the tomb in the British Museum mentioned by Mr. Wyatt Papworth. He knew that tomb very well, and had seen it in company with Professor Aitchison and others. It did not strike him as affording an illustration in corroboration of Mr. Papworth's views. It was a marble tomb, with a roof which had no indication of tiles upon it. A very small opening was made very near the ridge at one of the pedimental ends, and a similar opening diagonally at the other end. These openings had been covered with small panels, which fitted tight and rested on ledges. What purpose they might have served was not clear. They might have served as openings through which to deposit offerings to the dead, but they did not strike him as looking like reproductions of any system of lighting buildings from the roof.

Mr. R. Phené Spiers said he thought it was possible, as had been suggested, that some amount of light was obtained in the naos by covering the coffers of the roof with slabs of semi-transparent marble.

Professor Aitchison said that although Pausanias described with some minuteness the details of the interiors of the temples he visited, he did not say how they were lighted or at what hour of the day he visited them. After Fergusson published his theory of the lighting of the Parthenon, M. Charles Chipiez wrote a pamphlet on the subject in 1878, and he instanced the Temple of Jupiter Panhellenius at Egina as a strong proof of Fergusson's theory being right, for he told us that M. Charles Garnier found the remains of bright red on the flutes of the upper columns, but none on the lower ones; and he accounted for that by saying that the light coming in from the back of the upper columns made the fluting imperceptible, and therefore they were obliged to make it visible by a very bright colour. Pausanias said that the Temple of Apollo, at Bassæ, was roofed with stone; but that may have merely meant the sanctuary where the statue of the god was. Some of the temples that Vitruvius spoke about were hypæthral, not because they were so designed, but because there were no funds to roof them.

Mr. Stannus and Mr. J. M. Brydon having made a few remarks,

Mr. Penrose again spoke in reply to certain questions which had been asked. One was with reference to the existence of staircases up to the roofs of temples; there was no doubt about that. There was one very good, very well-preserved staircase in the Temple of Concord at Girgenti. He had been up and down it with great ease, and there were the remains of several others; but one example in thoroughly good condition carried the point. Where Dr. Dörpfeld spoke of the roofs being covered with loam as well as other things, he

seemed to derive that from an inscription no wise differing from a specification of a building connected with the harbour at Piræus, in which loam was mentioned to be used in connexion with the tiles. Those tiles were probably terra-cotta tiles, and it was quite possible that loam was also used in roofs covered with these great marble tiles. In Athens they were not of the ordinary Pentelic marble, which was of a comparatively close texture, but were always of Parian marble, which was remarkably transparent; and therefore there was a great probability of that marble having been used to light the interspaces of the roof to some extent. But he doubted whether any appreciable light could have come through openings in the *lacunaria* after having been transmitted through the semi-transparent tiles. Vitruvius most distinctly spoke of the interior part of the temple being open,—his words were "*in interiori parte*,"—so that involved his simply confining his attention to that part, the naos only; and in some temples,—certainly at Branchida, near Miletus, and probably at the great temple at Argirntum and at the Temple of Jupiter Olympius at Athens, was entirely open to the sky; but when Hadrian put up the statue, and the pedestal on which it stood, he would have covered it to protect it. There might have been on the whole roof very sufficient windows opening close to the ridge, which would have admitted all the sunlight that was necessary to shine fully on to the naos. He could not think that so much labour would have been expended on the chryselephantine statue and other works of art if they had only been intended to be seen by the people outside at a very great distance, because the distance would have been quite 200 ft., and the whole temple was about 350 ft. long.

Mr. W. Kidner said that only those who had lived in tropical countries were aware how much light can be let into a building through a small aperture.

The President, in putting the vote of thanks to Dr. Dörpfeld, coupled with the name of Prof. Aitchison, remarked that the subject was one in respect to which no amount of discussion would ever lead to a definite conclusion. Perhaps it was as well that that was so, because, if they could arrive at a conclusion, they should lose one of the most interesting subjects of speculative inquiry.

Professor Aitchison having said a few words in reply, the meeting terminated.

The next meeting of the Institute will be held on Monday, January 9, 1893.

THE ARCHITECTURAL ASSOCIATION.

The fourth ordinary general meeting of this Association was held on Friday, the 16th inst., in the Meeting-room of the Royal Institute of British Architects, 9, Conduit-street, the President, Mr. H. O. Cresswell, in the chair.

Mr. C. W. Wallis was elected a member, and Mr. E. S. Gale, the senior honorary secretary, announced that the Royal Institute of British Architects had presented their new volume of "Transactions" to the Library of the Association. A vote of thanks was accorded to the Institute.

The President said he desired to call the attention of students to the lectures in the Fourth Division on the history of architecture, which had now commenced.

Mr. F. Inigo Thomas then read a paper on "The Formal Garden," which we print in other of our columns. [See p. 496.]

The President said that the Committee had invited Mr. W. Robinson to attend that evening as the representative of the landscape gardeners. He regretted that that gentleman was unable to attend, but he had sent a few remarks on the subject, in the form of a short paper, which the honorary secretary would read.

Mr. Gale then read Mr. Robinson's paper, which was as follows:—

A Few Words on Garden Design in relation to "Formal Gardening."

Let me thank the Association for allowing me to say a few words on this subject. I will confine myself to existing things, and not speak of old books, which have little bearing on the present state of gardens. The architect is a good gardener when he makes a

beautiful house. That is a thing for which one must ever be grateful. Whatever is to be done or considered afterwards, one is always helped and encouraged by its presence. On the other hand, scarcely any amount of skill in gardening softens the presence of an ugly building. No one has more reason to rejoice at the presence of good architecture than the gardener and planter, and all stonework near the house, even in the garden, should be dealt with by the architect in every part. Such, at least, is my view. But when architecture goes beyond the strictly necessary round the house, and seeks to replace what should be a living garden by an elaborate tracery or pattern work, then I think error and waste are at work, and the only possible result is ugliness. The proof of this is at Versailles, at the Crystal Palace in great part, in the old gardens in Vienna, at Caserta, near Naples, where there is a far from beautiful stone garden. One may not so freely mention private places as public ones, but many ugly and extravagant things have been done by trying to adapt a mode of garden design essential in a country like Italy, where people often lived for health sake on tops of the hills, to gardens in the plains and valleys of England. I know of a terrace in England built right against the house, so as to exclude the light from and make useless what were once the reception-rooms of a great house! That deplorable result came about by endeavoring to adapt Italian modes to English conditions, and was the work of Sir Charles Barry. To anyone really interested in the question, one of the best places to consider it is the upper terrace at Versailles, looking from the fine buildings there to the country beyond, seeing how graceless and inert the whole vast design is, how the clipped and often now dying, because mutilated, yews thrust their ugly forms into the landscape beyond and rob it of all grace. To those who tell me this sort of work is necessary to "harmonise" with the architecture, I say no, there are better ways; to rob fine buildings of all dignity and repose by a vast geometrical "pattern" is the worst way. Where formal gardening is done on a large scale, its cost and maintenance are monstrous. The uses and construction of any building made to be lived in secure if the care without which it cannot long exist. Even with the support of a State like France the repair of elaborate stonework in gardens is an endless and almost impossible task, as anyone may see who visits frequently that vast extravagance, Versailles. Nearer home we may see something of the same kind near the huge stone hesins of the Crystal Palace. Is it in the interest of architecture that noble means should be so wasted? As the cost and difficulties of the finest work in building increase, the more the need to keep it to its true and essential uses, especially in face of the fact that half the houses in England require to be rebuilt if our architecture generally is to prove worthy of its artistic aims. I delight more than anyone I know in walls for my roses, and huld walls, provided they have any true use as dividing, protecting, or supporting lines. I am not afraid of a straight wall, but very much prefer it in many cases. To take advantage of sunny sheltered corners in and about our old or new houses and make delightful little gardens in and near them, as were made at Haddon, Powis, and Drummond Castle, is quite a different thing from cutting of the landscape with vast formal patterns. I cannot call them gardens. I find it implied by some writers on this subject that "design" can only concern formality,—an extraordinary statement. The artistic massing and giving picturesque effect to groups and groves of oak, cedar, or fir is far higher design than putting trees in lines. There is more true and subtle design in Richmond Park and many noble parks in England, where the trees are grouped in picturesque ways, and allowed to take natural forms, than in a French wood with straight lines cut through it. In the old days when designers dealt with but a few trees, and in many countries not a trace of landscape garden existed, it was well to carry the only formal and "decorative design" into the garden. Now a totally different order of things has arisen, because we have tens of thousands of beautiful things coming to us from all parts of the temperate and northern world, and people who know these things will not accept a book design, such as Nesfield adopted at South Kensington, instead of our lovely and infinitely varied garden flora. The trees of California, Oregon and Canada alone

form a tree garden in themselves, and it is absolutely impossible to lay out gardens of any size or dignity without a knowledge of those and all other hardy trees, not only in a cultivated but in a wild state where possible. If anything demands special study it is that of garden design with our present materials. If that art is to be mastered the work of a life must be given to it, and, more than that, a life's devotion. No less, I presume, is the sacrifice his own art requires of the architect. I do not ask favour for any one way of my own or of others. There is no such thing as a style fitted for every situation. Only one who knows and studies the ground well will ever make the best of a garden. Any "style" may be right if the site fits it. I never see a house, the ground around which does not require treatment, suited to itself only. A garden in any of the districts about Naples is impossible without much stonework to support the earth. In the neighbourhood of London or Paris such necessity seldom exists. But these considerations never enter into the minds of men who plant an Italian garden in one of our river valleys, where, in nine cases out of ten, an open lawn is often the best thing before the house, as at Bristol House, Roehampton; Greenlands, Henley-on-Thames; and in many gardens in the Thames Valley. So, too, there are right and wrong ways in formal gardening. Haddon, Knole, and Chatsworth on the one hand, and Igham and Rockingham without a single yard of stonework are absolutely needed for the house and its approaches, and others with a fortune spent in vast display of costly stonework absolutely needless and only effective in robbing the foreground, of a fine landscape of all repose and picturesque beauty,—or even shutting it out altogether, as has not seldom been done by a needless terrace-wall. It is worth noting that many of these terrace-gardens out of place shut off the house from the landscape near. That I need not say in the case of a beautiful house is often an irreparable loss. The idea in some minds that the old style of building in England was always accompanied by elaborate formal gardening is proved to be erroneous by many beautiful old houses. The Elizabethan house had often an ample lawn in front, or plenty of grass near, as for example, at Wakehurst. Such houses are quite as delightful in effect as the old houses and castles where terracing was necessary and right, owing to the ground, such as Naworth, Berkeley, Powis, and Rockingham. Large formal gardens are by no means a necessary accompaniment of our finest domestic architecture. Of this there are many instances among the finest old English houses, Tudor and Elizabethan. The idea that trees must be clipped to make them "harmonise" with architecture is a mere survival. In the old days of garden design, when in any northern country there were few trees in gardens, it was, perhaps, expedient to slash these trees into any shape that met the designer's view. But now that many beautiful trees and shrubs are coming to us from many countries, the aim of true gardening is, so far from mutilating them, to develop their natural forms. In by far the greater number of beautiful places in England, from Knole to Haddon, and from the fine west-country houses to the old border castles, there are many of the fairest gardens where the trees are never touched with shears! Sutton-place, near Guildford, built, I think, in 1521, is one of the most beautiful old houses in the home counties, and its architecture is none the less delightful because the trees near show their true natural forms and are not clipped. It is also an example of a fine old house around which there is no elaborate stone garden,—and where none was required. It would be as hopeless to design a building without knowing anything of its use or inhabitants, as design a garden without full knowledge of its nobler ornaments. Trees and the many things that go to make our garden flora vary much in form, habits, and hardness, according to soils, situations, and districts. Errors of the most serious kind arise from dealing with each thing without knowing them well. Any attempt to keep the gardener out of the garden must fail, as it did in our own day in the case of the ridiculous broken brick and marble flower-heds at South Kensington. Except for what is mostly a very small area near the house, the architect and garden-designer deal with distinct subjects and wholly distinct materials. They should work in

harmony, but not seek to do that for which their training and knowledge has not fitted them. If a genius should arise who will master and practise both arts well he will deserve our sincerest felicitations!

Mr. Leonard Stokes, in moving a vote of thanks to Mr. Inigo Thomas for his paper, said he could not pretend to anything more than an amateur acquaintance with the subject. Mr. Thomas seemed to lay down distinctly that there might be two things surrounding one's house: either a park, or a garden; but Mr. Robinson seemed to think that there should be a park only. Of course, they were only speaking of large houses. Mr. Robinson apparently objected to having a small part of the park set apart as a formal garden. He (the speaker) did not see why they should not have both. Because of the districts where clipped trees in his garden, he had no desire to clip every tree in the neighbourhood. One of the greatest charms about a fine house was to have part of the grounds laid out in a fine way. If the landscape was inclined to be varied in itself, he thought it would add greatly to the charm of the whole to have part of the ground laid out in terraces and regular forms, but, of course, it depended a great deal upon the circumstances. If one had not a formal house to begin with, he did not think it was desirable to have a formal garden; and if one had a picturesque old house that had been altered and added to, and partly pulled down and rebuilt, he thought they wanted a garden something in the same style to harmonise. They did not want a large geometrical design laid out in front of a picturesque house. In the case of a large mansion with regular wings, he thought that the garden ought to be laid out in a formal way; but when they had an irregular house, on an irregular site, he did not think the situation called for a formal garden. Nor was it possible to provide anything in this way of formal gardening in connexion with an ordinary villa; the plot of land available for villa and garden was altogether too small. Perhaps Mr. Thomas could give them some information as to the cost of making these formal gardens. For instance, he understood that one could purchase yew hedges, so many feet high, at so much per foot run. He had seen formal gardens in which part of the arrangement was laid out in parti-coloured broken marble. One could have formality and vulgarity, just as one could have formality and good taste. At the same time, he thought that if the client insisted, it would be possible to have a picturesque garden in good taste. In conclusion, Mr. Stokes referred in terms of high commendation to the excellent pen-and-ink drawings with which the lecture was illustrated. Most of the drawings had no doubt been seen in their published form in Messrs. Blomfield & Thomas's book, but they probably had not seen the originals, which were very beautiful specimens of penmanship.

Mr. Shuffrey said he had much pleasure in seconding the vote of thanks to Mr. Thomas. He thought that it was very fortunate that the subject had lately come under the notice of architects very much, and was being thrashed out, for he thought there was no doubt that the subject was one which ought to be treated by architects. To build a house and leave it on the ground without any consideration of its immediate surroundings seemed to him to be entirely wrong. He did not think that some of the old prints which were exhibited helped the cause of the formal garden. In looking at the illustrations of Hampton Court, the thought would be "How monotonous it must be to traverse the whole of those paths before getting into the open country!" He thought that Hampton Court and Versailles, and other large places, gave them the formal garden in its exaggerated development, and he thought that Mr. Robinson, in mentioning Versailles, had seized one of the examples where the enormous size militated against the interest of the place. The difficulty of treating smaller sites with a formal garden had been touched upon by Mr. Stokes. There was no doubt that if one had to apply the same conditions to a small site, one had to have a very firm hand, and to be content with very little treatment; and that was a thing which the ordinary gardener would not be satisfied with. To take a 50 ft. plot, 200 ft. long, with a house in the middle, and there was not much to be done in the way of formality. In planning trees, sufficient consideration was not given to the ultimate shape

which the trees would take. They were planted too thickly together, and in a few years' time it was found that they could not grow together. Then began the clipping, and they got a number of round shapes of various sizes jumbled up together. If formality in the treatment of trees was to be carried out successfully, it must be considered from the initiation of the design. There was the difficulty that the work took so many years to get any result from, that the client was disposed to dislike to have to wait so long. He was afraid that if we had the yew hedge that Mr. Stokes referred to, and bought it from the nurseryman, it would not keep out the wind. It was only by keeping them close together, and clipping them for a number of years, that those pleasing warm and dark colours which they were all so fond of were produced. In books published of late years on the subject, particularly in that by Mr. Sedding, many illustrations were given of fantastic forms of clipped trees. That was a matter of taste, but when it got to be fantastic he thought it ceased to be pleasing, and caused the practice of clipping trees to be ridiculed.

The President, in putting the vote of thanks, said that he agreed with Mr. Stokes in saying that everything must be considered on its merits. That applied to gardens as well as to anything else. He thought it was impossible to lay down any guiding rules as to the way in which a garden should be laid out. He thought that Mr. Thomas, by exhibiting to them certain illustrations of gardens, had very clearly shown all that could be done in regard to the treatment of varying sites. From the book lately published by Mr. Blomfield and Mr. Thomas one could get a great deal of useful information. He thought it was impossible to lay down any hard-and-fast rule for the treatment of gardens. There was one difficulty in reference to the illustration of gardens which had always struck him, and he thought that Mr. Thomas had shown the way out of the difficulty, and that was how to show them on drawings. If one made a plan of a garden, it was somewhat uninteresting, and to the person unaccustomed to the study of plans, it meant nothing at all. The favourite method formerly seemed to be the old-fashioned bird's-eye view, but it had the defect that we were not birds, and could not possibly get the *view d'œil* from any point of view. Mr. Thomas had adopted a different method, and had given the effects to be obtained at different points of the garden, as one saw them in walking round. The addition of a plan would be of assistance, as it would show the means by which the different effects were produced. Having referred to Evelyn's garden at Wotton, the President said that immediately surrounding the house there must be a certain amount of formality. As Mr. Stokes had said, a very large and regular house seemed to suggest a formal arrangement, while a picturesque house did not. The clipped yews seemed to be the principal thing objected to by Mr. Robinson, who waxed very merry over the fantastic shapes which they were sometimes made to take. He told them that the yew-tree, left to grow in its own natural way, was a very beautiful object. They were aware of that, for many of them had seen fine yew-trees in churchyards; but it seemed to him that that statement of Mr. Robinson's somewhat begged the question, because yew-hedges were made with a definite object and purpose, viz., that of providing shelter. He had much pleasure in putting the vote of thanks to Mr. Thomas, with which he should like also to couple the name of Mr. Robinson for so kindly sending them his ideas on the subject.

The vote of thanks having been agreed to by acclamation, Mr. Inigo Thomas briefly replied, one of his observations being to the effect that it was not necessary that a formal garden should be a large one, for some of the most beautiful of the old formal gardens which had survived were small,—mere cottages, gardens, in fact.

The meeting then terminated.

UNIVERSITY COLLEGE, LIVERPOOL, &c.—Mr. George Waage, of Salford, writes to say that in our notices last week of the opening of the University College at Liverpool, and the Cathedral Extension, Manchester, we omitted his name from our lists of sub-contractors, and he asks us to mention that he made and fixed the whole of the wrought-iron casements for the former building to Messrs. A. Waterhouse & Son's instructions, and also the gunmetal casements for the latter work. The omissions were not ours.

ON FORMAL GARDENS.*

IN dealing with the surroundings of a building, there are, nowadays, held to be two ways. That is to say, I believe it is so with the generality of the public, if the small section who style themselves "architect" are not altogether in accordance with the rest. The most approved method at present is, in the words of a recent writer on the subject, "to take true cognisance of nature's means for the expression of beauty, and so dispose those means artistically as to co-operate for our delight in given conditions." I hope you all fully understand the meaning of this, since for my own part I am bound to confess that I do not quite fathom the deeper subtleties of the phrase. But, then, I cannot bring to bear on the subject such a keenly analytical mind as some of you no doubt will. The writer is a "Landscape Gardener," and this is a definition of his method, but if we turn to the actual work of the landscapist we find on examination that his stages of procedure are something as follows—Here is a house to which we are to add beautiful surroundings. First, "take cognisance" of the natural undulations of the soil. If there are none we must proceed to make some. Here is a door; make a path to it, but take care that your path does not preserve a straight line for any distance from the house. If there is a slight depression in the ground, it may well follow the course of it, but if not its course may be arbitrary, only it should be made to appear to be otherwise by a mound raised in the loop of the path, on which a rhododendron bush may be planted with effect when we come to that part of the "design." It may be mentioned here with advantage that to the landscapist the word "design" is synonymous with the word "intention"; and anything that is designedly done is *ipso facto* design. But to continue,—this is the front door and requires a carriage approach. Some people might say it would be stately and dignified to bring the drive straight across the park through an avenue of elms, but, perhaps, it will be better to wind up through the new plantations, thereby avoiding an early view of the house and making the park appear larger than it really is. In the matter of planting it will be necessary to order from the nursery specimen trees of all kinds whose natural habitat is any quarter of the globe rather than England, and disperse them with due consideration so that each tree will form a foil to the next. It is a matter for congratulation that the house is placed on the summit of a hill, for though it may be a trifle exposed to the wind, yet an extensive view is to be obtained without any lawn will afford a convenient space for the nursery, and especially those that have the more difficult Latin names, since such information will tend to make a lasting impression on your friends. You might with advantage make a lake in the bottom there, curving its banks to represent nature, and so concealing the end that your friends will mistake it for a river.

This is the spirit in which the landscapist approaches his work, and it is just this indefinite intention that I wish to combat so strongly. Mr. Richmond said in a recent paper of his read before the Art Workers' Guild that our art lacks virility nowadays, and, if this applies in the arts of which he was speaking, it certainly holds good in the matter of gardening and building also.

In the first place, the origin of the word "garden" is "gath," meaning an enclosed space. Of course, it may be said that one cannot claim a forgotten meaning for any word, but in this respect it is on a par with several other English words by comparison with which I hope to make it clear that the original is the true meaning, and that it is only forgotten by those who have given little or no thought to the subject. Take the word "etching," for instance. How many people there are who have never yet awoken to the fact that an etching is anything more than a pen-drawing pure and simple? If one makes so bold as to explain that to "etch" is to eat, a puzzled expression steals over their faces, which is apt to expand into a broad smile of incredulity. And further, it is hardly necessary to remind you how altered is the meaning of the term

* A Paper by Mr. F. Inigo Thomas, read before the Architectural Association on the 16th inst., as elsewhere mentioned. (See p. 494, ante.)

"architect," and, as Mr. Jackson has pointed out, that of "surveyor," too. Now if we wish ourselves to be understood, we must surely be more precise in these matters, and if necessary, start afresh with a definition of terms. Suffice it to say, that of all things my conception of a garden is an enclosed space, and among the characteristics of the formal garden, I think you may safely put enclosure at the head of the list. No matter what the form of this boundary, each enclosure will be a separate garden in itself. Hence the plural term "gardens," which, if applied to the work of the landscapist, has no meaning at all, since his scheme (if so it may be called) wanders on indefinitely, without let or hindrance, except for such weak bonding lines as are afforded by an iron railing three bars high, or a sunk fence.

In the old engravings the garden-courts are sometimes figured with reference to a note, in which case we find them described individually by such terms as "west garden," "base-court," "parterre," "coronary garden," and the like. But the walls and hedges that were employed for this were not only of use in keeping distinct the various kinds of gardens.

In 1701, we read in Defoe's "Tour,"—"The Pond-garden [at Hampton Court] was laid out into small enclosures surrounded by tall hedges to break the violence of the winds and render them proper for the reception of such exotics in summer as were moved out of the conservatories during the season." And Mr. Baring Gould, in his book on "Old Country Life," comments on the capital shelter that these garden-courts afforded. Mr. Elgood, too, a painter whom some of you may know as particularly favouring this kind of subject, was telling me that while he was making studies for a picture at Arley, in Cheshire, he was astonished to find how effectually the tall yew-hedges protected him from a violent wind that was blowing outside. For this purpose yew is certainly the next best thing to stone or brick, and in some respects even better. A wall is more monumental, but, if unsympathetically built, will never give a chance to all the wealth of vegetation that makes the charm of an old wall. Again, a wall is not so hostile to a flower-herd as a yew-hedge, for the yew, being a greedy plant, sucks much of the good from the surrounding soil that ought to go to the flowers. But against this, it may be said that there is no finer background for flowers than the sombre green tapestry of yew, and there is no better protection from wind than is to be obtained by the filtering property of a thick hedge. And besides the actual use these divisions are for shelter, they also have a sentimental charm in the idea of seclusion and mystery that they give to the ground so divided. I know of nothing more suggestive of hidden beauties, and more stimulating to the imagination, than a glimpse of sunlit lawn with stately flights of steps that is sometimes caught through an open garden door.

Given the enclosure, in my ideal garden formality goes a little further. The paths are straight, or at least geometrical. The flower-borders enclosed with a trim edging of box, and the fountain has its softly-moulded rim of mossy stone. The turf is level as a table, and whatever standard yews are necessary to emphasise points in the design will be clipped into quaint shapes as shall suit my fancy. But inside the borders and over the walls, flowers and creepers run riot.

From the works of the landscapist, one would judge that, having made his borders irregular in outline, he feels that his responsibility is ended, as it seemed to be a matter of indifference to him whether they are planted with formal lines of flowers or not. The beds so planted in the London parks are of use to inform us how even in size certain plants can be grown if properly tended, but there the interest ends, and we begin to wonder whether after all the game is worth the candle. In short, I think it should be evident that the landscapist's garden is no garden at all, but merely a wilderness, and in bringing his wilderness next to the house he is not only reversing the time-honoured usage of our forefathers, but is acting contrary to what must appear to be reason to all those who value decency and order. It is evident that his wanted natural treatment of the ground is not natural, but only slovenly artifice, and I would go so far as to put forward the apparent paradox that it is most natural for

man to be artificial. However, it would take more time than I have at my disposal to-night to discuss this part of the subject in all its branches, and perhaps it is hardly worth while to spend more time in trying to enlist any waverers on the side of formality and order. This term, "formality," carries with it now an implied reproach, so that one would prefer to use the word "regular" in the place of "formal" when speaking of gardens, since perhaps it offends the ear rather less.

The history of the early gardens in England is a little enveloped in obscurity. In the old MSS. they appear to be referred to rather as fruit-orchards than flower-gardens. For example, in the office of the Duchy of Lancaster is preserved an account rendered by the hallifer of Henry de Laci, Earl of Lincoln (who died in 1312), of the profits arising from, and the expenditure upon, the Earl's garden in Holborn, then in the suburbs of London, in the twenty-fourth year of Edward I. £9. 2s. 3d. in money of that time,—equal to about £135 of modern currency,—was received in one year from the sale of fruit alone. This tends to show that profit was the main object with which the garden was kept up, though, perhaps, it is hardly fair to take an instance that would of necessity be affected by the proximity of the metropolis. Alexander Necham evidently had in his mind the idea of a garden for pleasure when he said that a "noble garden" should be arrayed with roses, lilies, sunflowers, violets, and poppies. But probably much ingenuity was not shown in the design of gardens until the fifteenth century, when fountains and conduits begin to grace the pages of illuminated manuscripts. We hear of an early garden at Westminster and another at Windsor, but at first the flowers seem to have been a secondary consideration to fruit and vegetables. I should not, of course, advocate on this score the expulsion of flowers from the fruit-orchard or fruit from the flower-garden,—far from it,—as I think the combination of the two is very charming, and fruit fresh plucked from the tree has all the added sweetness that a flower has newly gathered from the parent plant. Nothing could present a more perfect picture than the fruit-garden of the Hospice at Laon, in Normandy, with its clusters of Tritoma, echoing the golden glow of apricots, and relieved by the soft blue blossoms of the men as they paddle about barefoot with brimming cans of water from the fountain.

It was the growing popularity of the game of hawls, requiring, as it does, a broad expanse of level turf that paved the way to the great pleasures of a later date. As to whether terraced or hanging gardens existed here in early times we are left rather in the dark. Many people seem to suppose that this method of treating the ground was the direct result of Italian influence; but as I am not aware that falling ground has ever been the private prerogative of the land of sunshine, I am inclined to think that it is just as likely to have been the rule here as in Italy. These good people are apt to be blind to the very essential differences between an Italian and an English garden. They ignore the preponderance of turf to gravel, the habit of growing more plants in beds than in tubs—the restraint in the matter of statuary, and the peculiarly English colouring that is given to the whole by our northern climate and materials. And even if, after all, we are bound to admit foreign initiative, why, pray, should we call our gardens Italian, if we feel our buildings of that time to be so essentially English that we have had to call them Elizabethan?

The privy purse expenses of Henry VIII. give us a good deal of information with regard to his gardening operations. These, with the help of a contemporary picture or two, and some little imagination, may conjure up for us a fair idea of the Royal garden of that time.

It appears to have been framed on a comparatively small scale, walled in and divided into four compartments by gravel paths, and the borders protected by barber-poled railings with a royal beast holding a flag at every corner. A part of it is to be seen through the doorway in a picture now at Hampton Court, but the view is very much curtailed by the figure of Jane, the fool, who is standing in the doorway. Mr. Ernest Law is inclined to think this garden was at Whitehall, but wherever it was it probably

represents the more ornate garden of the period.

The garden at Nonsuch was, perhaps, much in the same state as at the time of Henry VIII.'s death, when it was described by an eye-witness, in 1650, as follows:—

"It was cut out and divided into several alleys, quarters, and rounds, set about with thorn hedges. On the north side was a kitchen-garden very commodious and surrounded with a brick wall of fourteen feet high. On the west was a wilderness swarded from the little park by a lodge, the whole containing 10 acres. In the Privy garden were pyramids fountains and basons of marble, one of which is set round with six black trees, which trees bear no fruit but only a very pleasant flower * * * Before this palace was a neat and handsome bowling green surrounded with a balustrade of freestone."

All through the reign of Elizabeth her courtiers were vying with each other in the splendour of their palaces and gardens, and John Thorpe shows a design for one among his drawings at the Soane Museum. He notes, by the way, that there is to be "nothing out of square." Hatfield, Longleat, Hardwicke, and all the grand buildings of that most stately period had similar surroundings. Their arrangement was, with infinite variation in detail, something as follows:—Between the projecting wings of the house on the entrance front a space was paved in stone or marble, with a few steps leading down to a gravelled court, with walls on the side connected with the house. This was called the "forecourt," and often had a fountain in the centre between the porch and entrance gateway, with garden doors on the other two sides, as you may see at Montacute, in Somerset. Before arriving at this court there was in many cases a sort of ante-court, which seems to have been for dignity solely. In those days it was not the custom for guests to alight at the front door. Dinner being at about 12 noon, and bowls after, they would arrive in riding-dress probably, and dismount at the outer gate, approaching the house across the court on foot. Then those were the days of thick shoe-leather, broad-brimmed hats, and heavy cloaks that defied the rain. To one side of the house, and a little apart from it, stood the stables, with a kitchen-court between them and the house. This was called the base-court, and in it was hidden away all the untidiness that is consequent on the proximity of kitchen and stables. In this connexion it is worthy of note that these Elizabethans,—perhaps the finest type of men that England has ever produced,—did not think the stable buildings, or even the home-farm, unworthy of forming a continuation of the house itself. Nowadays, we are so highly civilised that our sense of smell and notions on hygiene have banished the farmyard and stables into the next county, and connected up with a telephone. For my own part, I have a decided predilection for stable and farm smells, and what country home is complete without the rattle of stable-shovels and the busy hiss of grooming? On the other sides of the house lay the more ornamental pleasure-gardens, under which head comes the "parterre," the "howling-green," the "coronary garden," "herb-garden," &c.

Perhaps the best contemporary account of an Elizabethan garden given with any regard to detail is to be found in a letter written by one of the officers of the Court to Master Humphry Martin, mercer, of London. It is dated from Kenilworth, 1575, and describes a visit of Queen Elizabeth to the Castle and, *inter alia*, the gardens. In front of the Castle was a terrace walk raised 10 ft. above the garden and 12 ft. wide; at either end were arbours "redolent by sweet trees and flowers," and along the balustrade, on the garden side, obelisks, spires, and coats-of-arms in stone, were set out at equal distances. Below this terrace was the garden, an acre or more in extent, divided into four quarters by fine sanded walks. In the centre of each plot rose an obelisk of red porphyry with a hall at the top. The garden was planted with apple trees, pears, and cherries. In the middle of the wall opposite the terrace was a great aviary, 30 ft. long, 14 ft. broad, and 20 ft. high, and in the centre of the garden a fountain of white marble rose out of an octagonal basin, "where," in the words of the writer, were "pleasantly playing to and fro carp, tench, bream, and for variety perch and eels—a garden then so appointed, as wherein aloft upon sweet shadowed walks of terras, in heat of soomer, to feel the pleasant whisking wynde above, or delectable

coolness of the fountain spring beneath, to taste of delicious strawberries, cherries, and other fruits even from their stalks."

John Evelyn, to whom we are indebted for much information on the subject, had always had it in his mind to write a great book on garden design; but, unfortunately for us, he never got farther than the headings of the various chapters. Among these, however, are references to the stage properties of the garden grandeur of his time, quite enough to show how much of garden lore has been entirely forgotten. In Book II. he proposed writing of "Knots, parterres, compartments, horizons, and embosements, of walks, terraces, carpets, and allies, howling-greens, malls, their materials and proportions, of groves, labyrinth, dales, cabinets, cradles, pavilions, galleries, close walks, and other relieves; of fountains, cascades, rivulets, piscinas, and waterworks; of rocks, grots, crypts, mountains, precipices, porticos, ventiducts; of statues, columns, dyalls, perspectives, pots, vases, and other ornaments."

From this it is evident that through the latter half of the seventeenth century garden design had been making great progress,—though Charles I. had not done much to encourage it, leaning, as he did, rather more to horticulture than design. Neither do we hear of a great deal being done under Charles II., though he it was who dug the canal at Hampton Court and made the garden at St. James's. Perhaps no apology is needed for rather frequent allusions to Hampton Court, since to study the history of the various changes there is to follow the course of design in all its branches from Tudor times downwards.

It is difficult to arrive at a very clear idea of the development of garden design up to the time of the Dutch influence, because it was not till then that engravings of country seats drawn from bird's-eye point of view became common. A Dutchman, named Knyff, was employed at the end of the seventeenth century to make surveys of many places in different parts of England. This he effected with marvellous accuracy, and handed over his drawings for engraving to a fellow-countryman, Jan Kyp, their joint efforts being published in a large folio entitled "Britannia Illustrata." From this time forward it becomes an easy matter to trace the course of design. Kyp continued for some thirty years to engrave subjects of a similar kind for various publications, notably Harris's "History of Kent" and Atkyn's "Gloucestershire." After his death, in 1722, his mantle seems to have fallen upon John Harris, who engraved some of the drawings by Badeslade in "Thirty-six Views of Gentlemen's Seats in Kent." This Badeslade was an independent artist, as may be gathered from some drawings by him now at Mount Edgumbe, showing the grounds there as they appeared in his time. I have here an old survey of the country round Delft, in Holland. It is the work of Peter Schenk, an etcher of Amsterdam, who lived about 1690. With infinite care he has drawn every ditch and dyke in that part of Holland. That this man was an artist in every sense of the word is evident from the exquisite drawing and subtle hitting of the globe in one of these plates. And in making his survey he has evidently taken the keenest delight in following out the intricacies that occur in the regular gardens that lie scattered over the country. At that time, Holland, seen from a balloon, would have, no doubt, appeared much as it is represented here,—in form at least, if not in colour. And if we consult the diary of Julia Fiennes, a lady who was riding through England for her health in the time of William and Mary, we shall find every reason to suppose that it was much the same in our own country. To illustrate this point I will read to you a few extracts from her diary, which, it may be of interest to note, has only lately been exhumed by a descendant of hers from a lumber-room, in which the manuscript had lain ever since it was written. Miss Fiennes has no pretence to style, and writes in an odd inconsequent way; but I will give it you *verbatim* :—

"Epsom is 15 miles from London. There are great curiosities in cut hedges and trees almost before all doors."

"They have trees in rows which they cut up smooth, and about 3 or 4 yards up they lay frames of wood in manner of a pent house, so that the branches on it and cut it smooth. They leave the stem of the tree to run up, and then cut it clear to the top, which they cut in round heads. . . . There are several good houses in or about Epsom. Sir Thomas Cooke's house has an enclosed walk before the gate, with swinging gates at

each end and a larger in the middle. . . . The garden is in form as Mr. Ratti's first flat, but larger, with a larger fountain walled in with freestone, a pedestal with little Cupids and Dolphins and Shells on which are images, and on the top a crown made all to spout water. The walls full of fruit. In the middle you ascend several steps to a bank, on which are iron-plated palisades with gilt top: gates to the same. Here is a large square with green walks and gravel and oval in the middle, with devices of little paths of gravel to cut the grass into shapes, squares, and 3 squares.

In the middle stands a gladiator on a pedestal and on the walls are Cupids at each rising of the walls from the bank.

On the left side is a summer house with palats of the seasons of the year.

Thence into another garden for kitchen stuffs and hott beds with convenient houses. From this great flat you ascend several steps at three places equal distances, and then long green walks between borders of strawberries, dwarf trees, and some with green squares set with Cypress, Myrtle, Yew, Holly cut fine, and flowers. Thus 3 several banks, the spaces are adorned. Then you pass on to a long green walk, the right side or end is a fine summer house, the bank all along graded with dwarf trees. This carries on not only the breadth of the house but the length of the whole ground which is for the other garden for use. And just at the end of the pleasure garden begins a large and long pond or Canal—the length of the walk, which has its banks cut fine. There is another great pond on the right side of the house, and two more in the grounds belonging to the left.

All this is sufficient proof of the care and thought that was being devoted to garden design at that time, and I think too of the intelligent interest shown on the part of the public. Miss Fiennes writes as if she was noting the points that would be likely to interest her friends in what she had seen. If we are anxious to know what has happened to all the glorious gardens that she attempts to describe, we must consult the shades of "Capability" Brown, Repton, and the like. For all their vaunted worship of the beautiful they were great sinners in this respect, and demolished every old garden that came in their way. Sir Uvedale Price, perhaps, if he had lived in our own day, would have been a devoted adherent of the formal school; but, having the misfortune to be born in a degenerate age, he was swept along by the tide of public opinion, and small heed was paid to his touching lament over the destruction of his own garden, a mistake he realised when too late to remedy.

The really great schemes for approaches, avenues, and much more that lends dignity to a building were generally due, it would seem, to the architect. In 1699 Sir Christopher Wren made a grand scheme for alterations on the north side of Hampton Court. A plan of this exists in the Office of Works, and shows a great courtyard facing north, with a semicircular colonnade leading up to the centre of the banqueting hall. From this entrance a vista of some miles in length was to lead northwards, flanked by avenues of trees, four rows deep, on either side. At a convenient distance from the Palace a cross avenue is shown, and at the intersection a large circle, called the "Diana Circle," where now stands the great fountain in Bushey Park. These avenues are all that was ever carried out of a conception that would have made a truly magnificent approach to Hampton Court, which is, of all things, what the Palace most requires. This scheme was on an altogether increased scale to that which was actually carried out on the east side. When Sir Christopher had framed the Churches of Hampton, Surbiton, and Ditton, so as to meet the eye standing in the central doorway of his eastern façade, he perhaps felt emboldened to attempt a still greater stroke on the north side. And Wren was working for a master who was likely to appreciate the extreme grandeur of his conceptions. King William passed much of his time at the Royal Palace of Leo, in Holland, and I have here an engraving of it that will, perhaps, give you some idea of the scale on which it was laid out. Recollections of Leo, coupled with a hope long cherished by the King of rivaling the glories of Versailles, have made Hampton Court what it is, and it is only a matter for regret that the loss of his patron prevented Sir Christopher from completing the whole of his contemplated designs. One is accustomed to be told that Henry Wise was the King's adviser in all these matters, but in reading the accounts of the alterations at Hampton Court during this reign, it is evident that the general conception originated in the mind of Sir Christopher, and it was only the details that were left to be carried out by Mr. Wise.

This progress, which had continued under Wren, with the help of Loudon and Wise, up to the death of William, was succeeded by a

decline, gradual at first, but rapidly increasing through the reigns of the Georges, till Addison's scoffs and Pope's satirical verse sealed the fate of the English formal garden. However short of a healthy revival, nothing better could have occurred since design had fallen into the hands of the nurseryman, and the stately old gardens lost their charm when the tender care was gone that had kept them trim and neat. Kent followed, and in the words of Walspole, "Leapt the fence and saw that all nature was a garden." This meant that the old walls were pulled down and so-called Nature allowed to usurp the place of the garden proper. "Capability" Brown next appeared on the scene. He was so-called from a habit of remarking (when he had successfully destroyed all trace of a garden) that "it had great capabilities." This man was allowed extraordinary licence, and no better example can be found of the tyranny of fashion over weak minds than is afforded by the history of gardens under his iron rule. He was the king of the landscape school, and certainly his ideas were not lacking in scale; but he had an innate horror of anything approaching dignity, which led him to cut down avenues and generally mutilate what had taken years of honest labour to effect. Cobham, in Kent, is an instance of his handiwork. Five avenues of limes once radiated from the central front, but four of these fell victims to his mania for destruction. He travelled about England, compiling books of suggestions for alteration of the various places. Coloured sketches of the house and surroundings as they appeared were covered with a fly-leaf, on which he drew his suggestions, plus eighty years of Nature's assistance, and other embellishments calculated to pacify his clients, the result being that English parks were enlarged by the addition of the gardens; but the English garden practically ceased to exist. And then, forsooth, we hear writers of the present day (on horticulture, be it observed, not on garden design) claiming the title of "English garden" for the anomalous production that has been in vogue from that time up to the present.

"Capability Brown" had as followers in his train Repton and Sir Uvedale Price, who handed on the tradition, such as it was, to the Hughes's, Milners, and Robinsons of our own day. Mr. Milner in a book distinguished neither as an effort in literature or the better qualities of etching, has retold the old story already, so well worn; and Mr. Robinson's publication stands a confessed counterblast to a book on the formal garden in England brought out by Mr. Blomfield and myself. To these three books I must refer you to form an unprejudiced opinion on the subject.

Having given a slight sketch of the rise and fall of garden design in general, you will be anxious to hear something more of the details employed in the realisation of these efforts. Perhaps the principle that seems of most importance after that of enclosure is change of level, and a great deal of variety is to be obtained by close-shaven turf seen at different angles with the light. Whenever possible, it has always been preferred that the ground should fall from the house rather than towards it, and though, of course, instances of the former treatment are most usual, still there is a certain charm in the latter, too,—which charm lies more in the view of the house from the garden than of the garden from the house. Tissington, in Derbyshire, and Kilworthy, near Tavistock, afford the peculiar effect that is hinted in Sir John Millais' picture of a garden with the gables and chimneys of an old Scotch manse just visible above the walls. The position chosen for the principal terrace was always, if possible, next to the house. But if, as at Ryocott, near Thame, the house already lay low, and new gardens came to be added subsequently, rather than forego the terrace altogether it was raised in masonry at the far end of the garden, and in this case the space underneath formed an orangery. Packwood, in Warwickshire, has a terrace 3 ft. high between the garden and orchard, with steps on either side, and at Hampstead Marshall there still remains an artificially-raised terrace of generous proportions.

Nothing seems to have had such a stimulating effect on the imagination of garden designers as rapidly falling ground. Wherever there have been these conditions a grand chance had come with them for ingenious device in steps and gradients connecting the various levels. Scotland, being naturally a hilly country, revels in highly imaginative

terracing works. The illustration of Barnclith, in Lanarkshire, will give you an idea of a homely instance. The sudden fall of the ground through three successive terraces has a very fine effect, and the curious way in which the steps to the garden-house radiate from the lower door jambs is worth notice. A Scotchman in a tam-o'-shanter cap, a retort from a whisky still, and a coffee-pot and cup, all in clift-hox, keep the path company beyond the steps, and touch a note of quiet Scotch humour and good cheer. This is the garden that is referred to in a paper written by Sir Walter Scott in 1827 for the *Quarterly Review*, in which he laments the modern neglect of symmetry and order in favour of the chaos that delights the heart of the landscape gardener.

Terraces were sometimes carried round two or three sides of a garden if the fall of the ground suggested such a treatment. Peshurst, in Kent, has a long terrace down one side of the main garden, and a wide one next to the house. Cusworth, in Yorkshire, has raised walks round three sides of the bowling-green, and Oxenheath, Kent, is shown in Badelsade's view with a terrace running round two sides of the garden next to the house, terminating in a pavilion.

The more fall, within reason, from terrace to garden below the better and bolder will the effect be. Haddon has a fall of 16 ft. Pitmidden, 13 ft., and Newton Ferrers, in Cornwall, 8 ft. At Oxford, the walk on the ramparts forms a sort of terrace to those of the College gardens that lie under the city wall, such as Merion or New College, for example.

Another form of earthwork that is to be found in some old gardens is the mount. It was made square or circular, with sloped sides and terrace walks at intervals, with a railed space at the top commanding a view of the country round. Lalsand, in his itinerary, speaks of a mount at Wriseshill Castle, in Yorkshire, as "written about with degrees like turnings of cockle shells to come to the top without payne." That in the garden of New College still exists,—it is 40 paces square at the base and about 30 ft. high, and though now entirely covered with trees and undergrowth, among their roots may still be found the stones of the steps that led from terrace to terrace, and the kerb that bordered the paths. This mount is engraved in a view of the gardens by Loggan in the seventeenth century, and a view of the garden at Wadhams shows a circular mount, of which no trace remains. A colossal figure of Atlas crowned this summit, bearing a globe on his shoulders. The largest mount that I remember having seen is at Heath Hall, Wakefield, and is locally called Mount Tarribyte, but it is on such a large scale that at first sight it is difficult to believe that it has formed a part of any garden scheme.

Bowling-greens were generally square, though sometimes a circular instance is to be found, as at Knole, in Kent, where it was surrounded by tall hedges of hornbeam, with arbours on two sides, and a sort of baldaquin in clipped work over the steps that led down to the house. This green was forty paces across and that at Bingham's Melcomb, Dorset, thirty by seventy-four, from which it would appear that dimensions were optional. There is a very curious oval-shaped bowling-green facing the house at Campsea Ashe, in Suffolk, twenty-five paces by fifty-two. A fine, old yew-hedge runs all round it, and from this rise at intervals twenty clipped yew towers, with outrances on the four opposite sides.

Grass alleys of ample width formed another pleasing feature in old gardens, and were bordered with clipped greenery or palisades of fruit trees, throwing a broad, even shadow across the turf. The garden at Hardwicke is divided into four compartments by wide grass alleys, with a circle in the centre, where one would expect to find a fountain or some conspicuous ornament. The end of each vista is set with a statue in lead, and four figures of the fine arts fill niches in the circle. As at Hardwicke, so elsewhere, statuary in stone, lead, or bronze played an important part in garden ornament. I cannot think at this moment of any existing instances of Elizabethan statuary, and I rather fancy that such things were not of common use till a later date. Obelisks, sundials, and heraldic beasts, with, perhaps, a curiously-wrought fountain or two, seem to have formed the stock-in-trade of Elizabethan gardens.

Perhaps of all the features of old garden design, none has called forth such violent in-

vective as the custom of pleaching.* It is generally supposed that it came in with the Dutch influence, but inquiry proves that it was the custom in England from much earlier times than these. On the other hand, it must be admitted that it was under the Dutch influence that it was carried to such excess as ultimately to bring the formal garden into disrepute from this very cause. No one who has tried it will deny that a yew-hedge when clipped gives a much quieter background for flowers than if left to its natural growth. And, as I have said before, the garden designer will feel the need of individual tress clipped into form to emphasise points in his design, but kings and queens carved in yew, or foxes jumping through a hoop, as you may see at Broomhall, in Suffolk, hardly tend to enhance the whole effect of the garden, and may well be left to those who care for such trifles.

However, at Packwood, in Warwickshire, there is an instance of pleaching that follows out a definite scheme through the whole garden, and commands more serious consideration. The main walks in this garden follow the shape of a capital T, and at the crossing rises a mount, with a tall cone of clipped yew. This was to represent the Mount of Olives, and on it was once a clipped figure of the Crucifixion. The whole arrangement follows out a kind of sacred allegory. At the foot of the mount stand the four Evangelists, and ranged on either side of the grass alleys that form the cross of the T are the twelve Apostles, and the stem is lined with yews to represent the multitude. This is the only garden I know that has a distinct connected idea running through all the clipped work, and is extremely interesting accordingly. Levens, in Westmoreland, has the Kings and Queens of England, and the old heraldic tradition is kept up in the keeper's cottage at Haddon, where the Manners peacock and the Vernon hog preside over hollyhocks and sunflowers. But falling a double interest of this kind, clipped figures are apt to descend into mere trickeries of a clever gardener.

With Tudor times passed away the old custom of surrounding the walls of the house with a moat, and water was henceforward used more for ornament and the breeding of fish than for defence. Of course, there are many instances of moated houses of a later date, but in these cases there is generally a small garden of some kind between the house and the water. A site chosen among the branches of a stream is always picturesque, if not altogether free from agree. It would be difficult to find anything of its kind more beautiful than the old house at Groombridge, in Sussex, when its twenty peacocks are preening themselves on the lawn, with the moat as their mirror. Ightam Mote is well known, and a seat of Lord Romney's in Kent, also called the Mote, is shown in Badeslade's view with the water still lying under one side of the house, which had been modernised in the style of the period. In the dressed grounds water was always subordinated to the general design, and enclosed within marked boundary lines of stone or brick coping. Large sheets of water such as were made at Wroset or Hampton Court were bordered with turf up to the margin, and so is the pond in the garden at Melbourn, and a smaller piece in a charming old garden at Sydenham, in Devonshire. No doubt in the treatment of this the Dutch influence was strong, though, generally speaking, more fall is obtainable in England than with them, and accordingly fountains are more easily worked. These latter were placed at intervals in the lengths of the water which generally stretched away from the house in the centre of some long vista, and a good effect was sometimes

obtained by falls at intervals from terrace to terrace, as at "the Mote" mentioned above.

Viviers, or fish-ponds, were often made at a short distance from the house, where carp and other coarse fish were kept, and a "stew," or small tank, at the end of a pond, served to keep apart the fish that were in good condition for cooking. These were placed in the stew after netting the pond, and the rest returned to the larger pools. The operation of filling the stew is shown in progress in an old engraving of a garden at Westerham, about the year 1720. Swans, ducks, and geese seem to have been kept in profusion on the fish-ponds, which cannot have tended to increase the supply of fish.

Perhaps the earliest example of a fountain still existing in England is that with a polygonal basin, that once stood at Cowdray Castle, and has since been moved to Woolbeding, in Sussex. Then there is the fountain at Bolsover, to which I have already alluded as dating, perhaps, from the time of Inigo Jones. The centre piece of the great Diana fountain in Bushey Park has a curious history. It was originally in the grounds of the palace, and formed the centre ornament in the Privy garden, where it was seen and described by Count Montecensy in the time of Charles II. But after this it was taken down, and in 1713 was removed by Sir Christopher Wren to the position it now holds, and a bill is in existence showing that 1,300*l.* were spent in repairs and fixing. It is rather remarkable that so few centre pieces should have survived in the old fountains. No doubt the constant flow of water and the action of frost has had much to do with it, but one often finds the stone kerb fairly complete when the centre has entirely disappeared. That they must have been common in Queen Anne's time is evident from the engravings by Kip, but very few have survived the ravages of time and the passing caprice of fashion.

Statuary is of the greatest use as a foil to the sombre tone of clipped yew or horn-beam, and perhaps stone or lead seems to be more at home in an English garden, as the lichens and mosses that thrive in our damp climate take to them more readily than the smoother surfaces of bronze or marble. In a small garden at Nun Monkton, in Yorkshire, is a terrace walk that overhangs the river Ouse, which is bordered on either side by allegorical figures in lead, with gilded trappings.

The alternation of these with masses of dark yew have a very telling effect. There are some fine figures at Glenham, in Suffolk, that came originally from Campsea Ashe, in the same county,—one of the Duke of Marlborough, and another of Prince Eugène,—stand on the outcrops front of the house, and scattered about in the same garden are lead figures of the seasons,—two black slaves bearing sundials and leaden hounds guarding an entrance-gate.

Newton Ferrars, in Cornwall, has two well-modelled figures of Mars and Perseus, and the gardens at Melbourn are alive with Cupids and other figures from ancient mythology. But leadwork was not only confined to figures. In the same garden at Melbourn is a large lead vase, probably the finest of its kind in England. It stands 8 ft. or 9 ft. high, and is supported by crouching apes. A relief of children at play enrounds the body of the vase, while masks, swags of fruit, and a plume of flowers deck the top. The vase at Penhurst is one of a pair that came from Leicester House, which stood on the site of the present Empire theatre. This was probably not an uncommon design, as there are some at Sprothorough in Yorkshire, which were apparently cast from the same mould. But this is not surprising, as it is known that in the last century a maker named Cheere had a yard at Hyde Park Corner in which he exposed such wares for sale. There were lead loads, too, at Sprothorough used to spot water in the fountains, and at Wootton, in Staffordshire, is a lead duck that seems to float on the surface of the water with a jet issuing from its mouth. Though it has a tendency to lie down as old age advances, lead is not so brittle as stone, which may account for our having more examples left than of the latter material.

A year or two ago I thought I would go and see what remained of the garden at Rousham that Pops describes in a letter to Martha Blount. For the most part the design was completely lost and overgrown, but among the

underwood I found two Cupids still clinging tenaciously to the necks of some leaden swags on which they had once, no doubt, ridden gaily astride. Stone figures, as I have said, are not common, but the woman bathing, on the fountain at Bolsover, may be taken as an instance of English work, perhaps about the time of Inigo Jones. But in a letter from Major Booke to the Rev. Samuel Raggie, in 1785, this figure is cited as a "Venus in alabaster," which is not unlikely, as that material is abundant in the neighbourhood.

We all know, of course, what capital work England produced in wrought-iron gates and railings during the last century. The impetus in this direction seems to have come from the work of Tison, a French smith, who made the great screens for Hampton Court that now stand in Kensington Museum, and are falsely attributed to Huntingdon Shaw. Their original position was on either side of the avenue leading to the bowling-green, and it is to be hoped the day will come when they may be reinstated there in some more suitable position at Hampton Court. Tison was to have made a set of gates for the entrance to Bushey Park, but for some reason the work was abandoned, and the present gates,—miserably small in comparison to the piers,—were allowed to fill the space that would have been better left to the master hand of the Frenchman. His influence spread all over England, and instances of elaborate wrought-iron work are too numerous to need particularising here. Indeed, each different craft employed in garden decoration would yield subject matter for a separate paper apiece. So, as time is short, and I have, perhaps, detained you too long already, my remarks shall be brought to a close.

The history of a subject of this kind is, of course, only the grammar. It forms, as it were, the rules by which the game is to be played, and that is where we who style ourselves "artists" should differ from those who hear after their name the honourable initials F.S.A. It is not enough for us to know that these things have been, or the exact period at which they were done. The all-important question with us is, what effect had the designer in view, and how may we hope to obtain equally fine effects ourselves? We should not be content to accept all this as mere history without making an effort to influence popular opinion in the direction of a genuine revival from a purely artistic point of view. But the practical difficulties that beset the designer nowadays are manifold and almost insurmountable. In the first place his client being presumably unfamiliar with the history of the subject will be at least surprised if not actually shocked at the suggestion of such a treatment of his grounds. It will strike him that a comparatively small area is to be enclosed, and that the sum to be spent is exorbitant. And it will probably be difficult to convince him that the desired effect can be obtained in a much shorter space of time than if handed over to the landscapist. Moreover, examples of this kind of work not always being ready to hand, there will probably be nothing to which he can be referred in support of the argument. And another obstacle which will loom up as the work is approached more closely, is the extreme difficulty of any exact estimation of the cost. Personally I have found it impossible so far to carry out works of this description in any other way than by schedule, as the field for design is so unlimited that a fairly free hand is absolutely necessary for success. A slight fall in the ground or a tree that is to be spared may be quite enough to start the imagination on a fresh flight. So all this points to the absolute necessity for a generous and cultivated client, falling which it would be madness for an architect to enter upon any such scheme. And I fear for many years to come regular gardening will remain the pastime of private individuals. It is not likely that public bodies will awake to its charms till this is once more admitted to be the natural and straightforward way of treating the grounds round a building.

[Some notes of the discussion which followed will be found on another page.]

THE KIMBERLEY EXHIBITION.—We are informed that Messrs. Robert Doyle & Son, Limited, have been awarded a Gold Medal at the International Exhibition, Kimberley, South Africa, for their air-pump ventilators and air-inlets. The Exhibition is ventilated throughout with the air-pump ventilators.


* We are unable to understand the persistent faith of the revivers of the formal garden that it is to be "pleached." "Pleach" does not mean to clip; it means to weave, to plait, to entangle; it is used in that sense by Shakespeare in an unmistakable passage (in "Antony and Cleopatra"); it is used in the same sense by Tennyson, who was a master of Old English, nor do we find it in any dictionary in the sense in which the "formal gardeners" use it. A "pleached hedge" was not a clipped hedge, but a hedge so interwoven an idea confirmed, by the way, in another passage in his *Aspen* ("Much Ado").

"And hid her steal into the pleached bowber Where honeysuckles, ripened by the sun, Forbid the sun to enter."

i.e., the flowers and stalks were so thickly interwoven as to keep out the sun. The formal gardeners appear to have found "pleach" used with a wrong meaning in some old gardening book, and persist in keeping up the mistake.—ED.

Illustrations.

SOUTH PORCH, LINCOLN CATHEDRAL.

 HIS drawing, by Mr. John Begg, represents the porch which was built on the south side of the prolongation of the choir of Lincoln, in the latter half of the thirteenth century, as a state entrance for the Bishop. It belongs to the portion of the cathedral which, as everyone knows, constitutes one of the most perfect examples of English Gothic of the Early Decorated period.

The drawing, which we are happy to have the opportunity of publishing, is an excellent example of Mr. Begg's very individual and artistic style of draughtsmanship.

AISLE WINDOW, BLACKBURN CHURCH.

The subjects of this three-light window are: in the centre light, Moses striking the rock; on the left hand, Abraham offering up Isaac; and on the right hand, Noah's sacrifice. The subjects are surmounted by canopies. The treatment has been kept light and white in effect, to harmonise with the Late period of architecture. The design is by Mr. Ion Pace, and was exhibited at the Royal Academy of this year.

SOUTH AISLE WINDOW, LEIGH CHURCH, LANCASHIRE.

The subject illustrated is the "Presentation in the Temple." In the centre light is a figure of the Virgin with the Child in her arms, and in the side lights are figures of Simeon and Anna. In the tracery openings are figures of six virgin saints: Faith, Cecilia, Agnes, Margaret, Catherine, and Barbara.

The window is by Messrs. Shrigley & Hunt, and the drawing was exhibited in the Royal Academy of this year.

A STREET CORNER.

THIS is a sketch of an actual example of an old Dutch street house, worked up into a drawing under the above title, and which certainly forms a picturesque enough corner of a street. The drawing is by Mr. Clarence Coggin, and was exhibited at the last Royal Academy Exhibition.

DESIGN FOR A MEMORIAL CHURCH.

THIS church, the drawing of which was exhibited at the Royal Academy of this year, was intended to be carried out in a pale red brick, a cream-coloured terra-cotta, and a pale green-grey stone for the buttresses, string-courses, pedestals, &c., of the exterior; the statues and bas-reliefs to be in bronze. The interior was to be executed in the same materials, and the nave to have a low-pitched timber roof, the aisles vaulted in brick. The design is by Mr. H. D. Wilkinson.

HOUSE, NEAR AMPHILL.

THIS house was planned with the object of being able to utilise the drawing and sitting rooms as one, when required, by removing the wooden screens.

The walls are faced with red brick and stucco over, and the roofs covered with small green slates. The hall and staircase are panelled throughout, and there is a high panelled dado in the principal rooms. E. H. S.

ADDITIONS TO HOUSE, WIMBLEDON.

THESE alterations consist of a new billiard-room and conservatory, additional bedrooms for servants, and the remodelling of the garden front of the present house, the latter work to be carried out in the spring.

Red rubbers have been used for external facings, and the woodwork finished white. Internally, the billiard-room is lined in teak, dull polished, and the mantel-piece in the ingle is of the same material.

Mr. Brasier, of Wimbledon, was the builder, and Mr. Arthur Ardron the architect.

* The plan was sent by the architect, but too late for production.—Ed.

ARCHITECTURAL SOCIETIES.

ROYAL INSTITUTE OF ARCHITECTS OF IRELAND.—On the 17th inst. the annual meeting of the Royal Institute of Architects of Ireland was held at 37, Dawson-street, Dublin, Mr. Thomas Drew, R.H.A., President, in the chair. The report of the Council was submitted. It contained the following passages in reference to architectural education:—

"Architectural education—the burning question of the profession of the day—has not been without the anxious consideration of members of Council during the past year. Frankly the Council tell the members that so rapidly has this movement developed, and the organisation of a curriculum of architectural education been effected in other centres of the Kingdom, that the architects of Ireland, taken at a disadvantage, are as yet absolutely without any surmise of how like advantages could be secured for their younger brethren in Ireland. So far only have we gone that we have consented—in our allied position to the Royal Institute of British Architects,—to have Dublin nominated geographically as a local centre of an education system, that we have held examinations for probationers of the Royal Institute of Architects. We advise deliberate delay in entering on the education crusade in Ireland until experience is gained of the working of the new organisation in London, Edinburgh, and other centres, and would appreciate the aid of the Institute in any proposals for promotion of Architectural Education in our country until the situation is better appreciated."

Sir Thomas Deane, in moving the adoption of the report, said he thought the Institute had arrived at a stage when they could hold examinations for persons qualifying as architects. He believed the Government ought if possible to place buildings above a certain size in the hands of the profession, so long as that did not militate against the public service.—Mr. Robinson, in seconding the motion, expressed disapproval of the system of competition in vogue.—The motion was passed.—The President expressed the loss which the Institute had sustained through the death of three of their members—Mr. Sidney Cox, of Limerick; Mr. A. Denny, D.L., Waterford; and Mr. Wm. J. Symes.—The ballot for the election of President, Council, and officers resulted as follows:—Mr. Drew was re-elected President. Members of Council:—Messrs. S. Symes, J. J. O'Callaghan, J. R. Carroll, C. C. Ashlin, C. Geoghegan, Wm. Mitchell, Sir Thomas Deane, J. L. Robinson, R. C. Miller, Thomas Pentland, A. E. Murray. Auditors:—Messrs. R. O'B. Smith and C. A. Owen.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—A meeting of this Association was held at the Birmingham and Midland Institute on Tuesday evening last, under the presidency of Mr. W. Hale, F.R.I.B.A. The formal business, which included the election of twelve new members, was followed by a paper on Ronen Cathedral, read by Mr. J. A. Grew, who, after giving a short description of the Cathedral, proceeded to discuss closely the beauties of the exterior. Referring to the west facade he pointed out that, though almost entirely covered with varied and intricate ornament, the main lines and masses are so disposed as to lose none of their importance, and that, as the visitor approaches the Cathedral from the narrow street leading to the place at its western end, it is not the ornament but the finely-proportioned mass and the imposing lines of construction which first attract his attention. Having drawn attention to many special points of interest, Mr. Grew brought a very interesting paper to a close.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The monthly meeting of the Edinburgh Architectural Association was held on the 14th inst. at the Royal Institution, Mr. Hippolyte Blanc presiding. Mr. T. Crichton Fulton, Glasgow, delivered a lecture on the "Electric Lighting of Large Buildings." A cordial vote of thanks was passed to Mr. Fulton for his lecture.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—The Leeds and Yorkshire Architectural Society held a "Social Evening" in the Queen's Hotel, Leeds, on the 19th inst. At the opening of the concert Mr. G. B. Bulmer, the President, presented a silver medal to Mr. Lindsay Grant for his drawings of ancient buildings.

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—On the 13th inst., at the ordinary monthly meeting of this Society, Mr. C. J. Innocent presided, and Mr. J. Starke Gardner, of London, read a paper on "Ironwork," illustrated by limelight slides. The paper reviewed the history of the blacksmith's craft in England, France, Spain, Germany, Italy, and elsewhere from the earliest

periods down to the close of the eighteenth century. A communication was read from the local Council of the Registration of Plumbers, asking the Society to use its influence in the direction of having plumbers' work separately tendered for, and ensuring its being carried out by duly certified and registered plumbers.

ENGINEERING SOCIETIES.

THE SOCIETY OF ENGINEERS.—The annual dinner of this society was given at the Holborn Restaurant, on Wednesday, the 14th inst. The President, Mr. Joseph William Wilson, jun., occupied the chair; and amongst a large company present were Sir Robert Rawlinson, K.C.B. (Hon. Member), Mr. W. A. McIntosh Valon (President-elect), Mr. Henry Adams, Mr. Jasch Church, Mr. Charles Gandon and Professor Robinson (past Presidents), Mr. G. A. Goodwin (Vice-President), Mr. S. H. Cox, Mr. Henry Fajja, Mr. G. M. Lawford, and Mr. W. G. Peirce (Members of Council); Mr. Alfred Williams (Hon. Sec. and Treasurer), and Mr. G. A. Pryce Cuxson (Secretary), Professor Ayrton, F.R.S. (President Institution of Electrical Engineers), Mr. W. Worthy Beaumont, Colonel Harding, Mr. G. T. Rait, and Mr. J. W. Wilson. After the usual loyal and patriotic toasts had been duly proposed and honoured, the chief toast of the evening, "The Society of Engineers," was proposed by W. N. Colam, coupled with it being the names of the President, the Hon. Secretary and Treasurer, and the Secretary. In replying to the toast, the President enlarged upon the rapid progress of the Society, both financially and numerically. At the last annual dinner the year's increase in membership had been stated at 8 per cent.; he was now able to state that the increase for 1892 had been equally good. This most satisfactory state of affairs was mainly due to several causes; the papers which were read at their ordinary meetings were carefully selected, and during the past year had fully maintained the high reputation of the Society; much time had been spent by the authors in their preparation and illustration. The meetings had been very well attended, and the discussions, in which the older as well as the younger members took part, had been increasingly practical and valuable. Then the professional visits, which had always constituted an important feature of their work, had been this year still more popular and well supported. They included the Tower Bridge, the South Metropolitan Gas Works at East Greenwich, the Kingston Sewage Works, the South and Vauxhall Waterworks at Hampton, Messrs. Willans & Robinson's Works, and the Great Eastern Railway Locomotive Works at Stratford. The progress of the Society was largely due to the unremitting labours of the Council generally, and in an especial degree to their Hon. Secretary and Treasurer, Mr. Alfred Williams, whose unabated interest in their financial and general affairs was invaluable; and last, but not least, to the business capabilities and unflinching tact and energy of their Secretary, Mr. Pryce Cuxson. Other toasts followed.

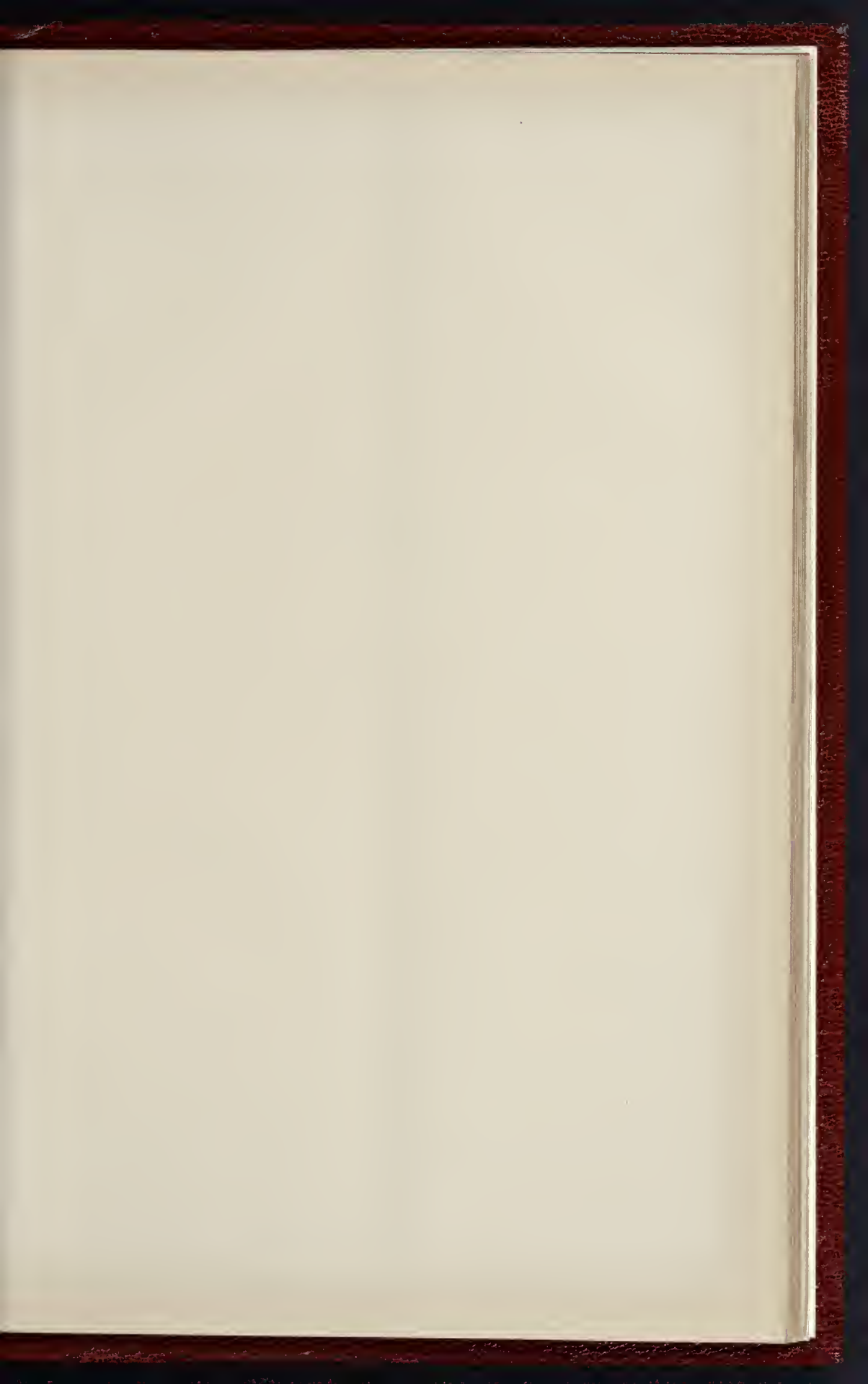
THE LONDON COUNTY COUNCIL:

FAIR WAGES AND CONTRACTS.

A SPECIAL meeting of this Council was held on Friday, the 16th inst., to further consider the Report of the Fair Wages Committee. We gave the text of the Report, and of the recommendations of the Committee, in our last (pp. 478, 479, ante), and we now give the forms of "Instructions for Tender," forms of Contract, Schedule, &c., for which we had no space last week. The Committee recommended that all instructions for Tender and Contracts under the proposed new "Standing Orders" (pp. 478, 479, ante) should be, respectively, as far as possible, in the following forms:—

"CONTRACT NO. ———
Instructions for Tender.

Tenders must be on the printed form and be accompanied by the forms of Contract and Schedules thereto and Bond. The Schedule of Prices forming the Second Schedule to the form of Contract must be fully priced out, and the Schedule of Rates of Wages and Hours of labour forming the Third Schedule to the Contract must be fully filled up by specifying all the trades which the contractor may require to employ in and about the execution of the Contract, and by filling into the proper columns against each trade specified the rates of wages and hours of labour and rates of wages for overtime (if any) recognised (and in practice obtained).



THE BUILDER, DECEMBER 24, 1892.

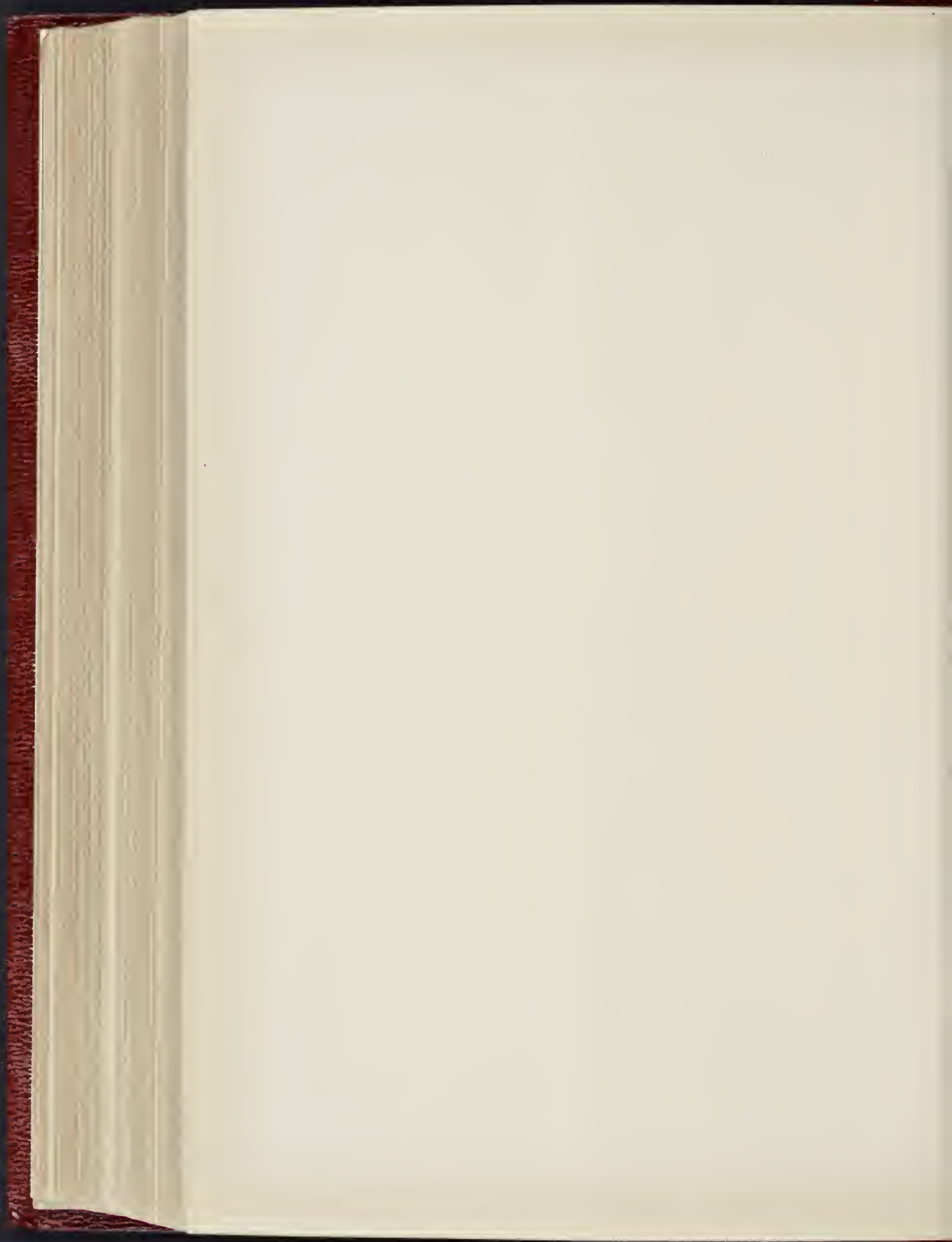


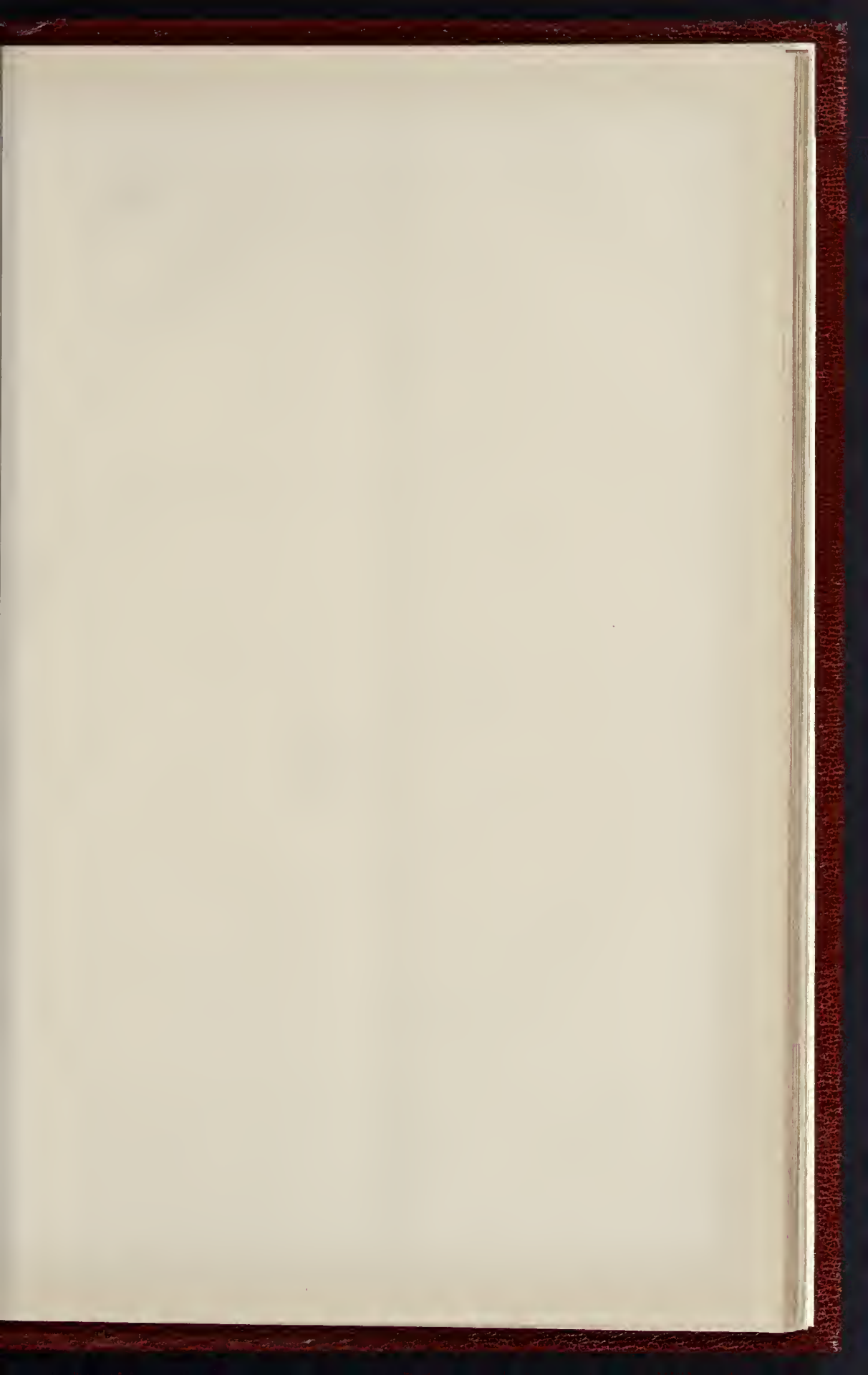


Lincoln Cathedral
The South Door

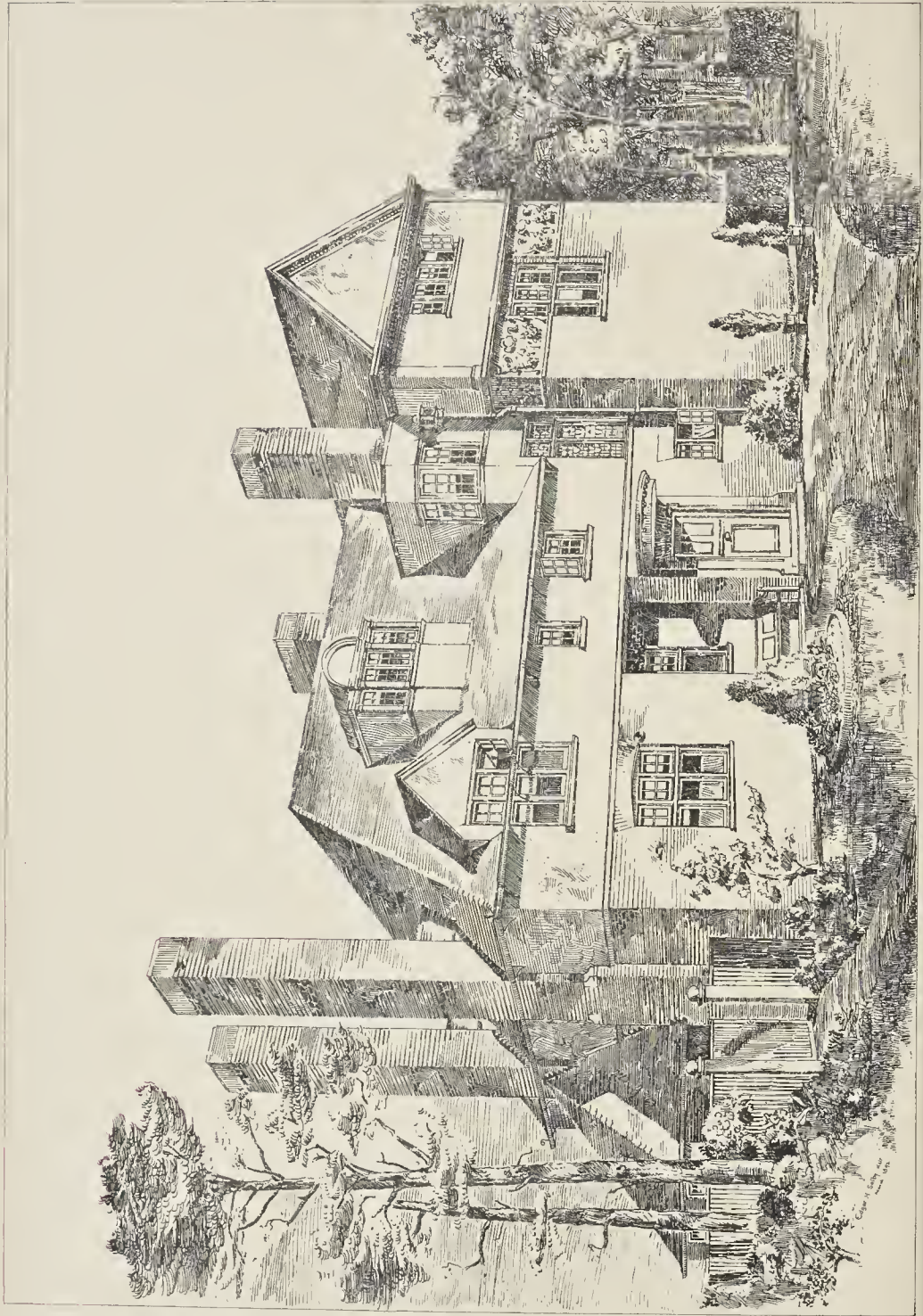
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INK PHOTO SPENCILL & CO. 44 & 45 EAST WARDING STREET, LONDON, E.C. 4.





THE BUILDER. DECEMBER 24, 1892.



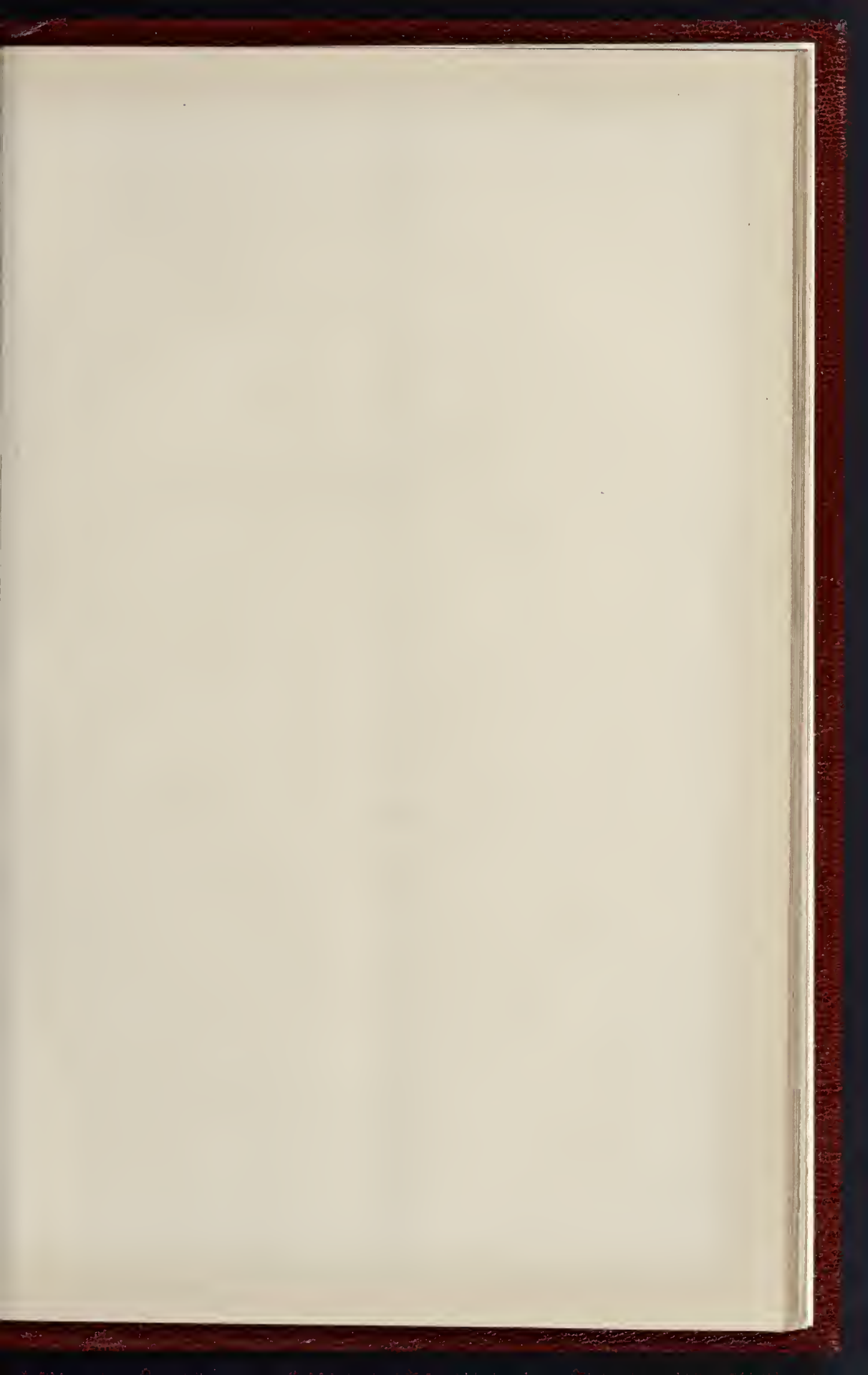
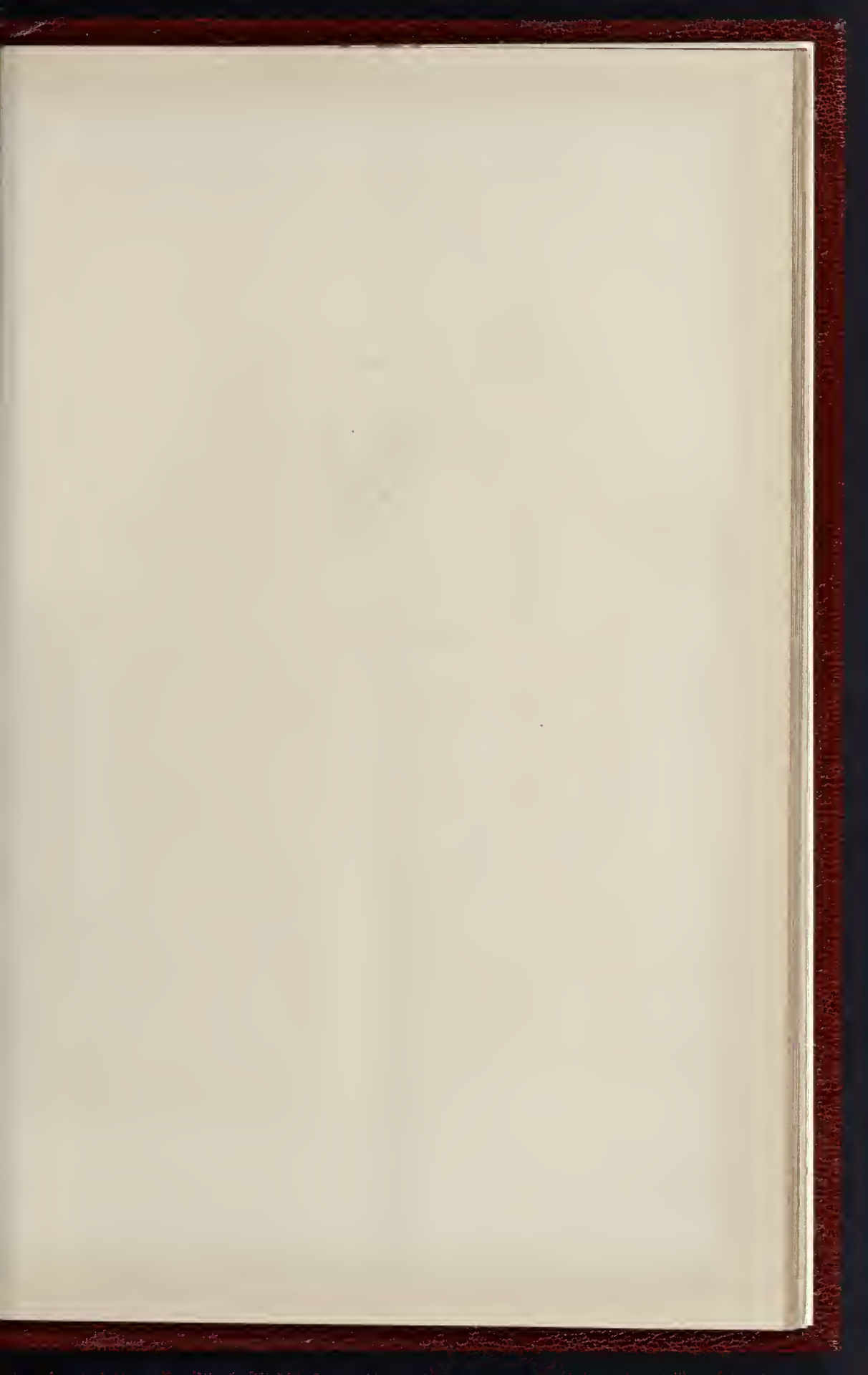




PHOTO-LITHO SPRAGUE & CO. 42 EAST HADFIELD STREET LONDON. -LINE 77.

A STREET CORNER—BY MR. CLARENCE COGGIN, A.R.I.B.A.

Royal Academy Exhibition 1892





INK PHOTO SPRAGUE & CO. 48 S. EAST HARDING STREET FETTER LANE, E.C.

SKETCH DESIGN: AISLE WINDOW, BLACKBURN CHURCH.—By MR. ION PACE.

Royal Academy Exhibition, 1892



1 IN.—PHOTO SPRAGUE & CO. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

EAST WINDOW OF SOUTH AISLE, LEIGH CHURCH, LANCASHIRE.—By MESSRS. SHRIGLEY & HUNT



PHOTO-LITHO SPRAGUE & CO. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

A PORTION OF PROPOSED MEMORIAL CHURCH—MR. H. D. WILKINSON, ARCHITECT

Royal Academy Exhibition, 1892

• Additions to Hoyle
: Wimbledon :

for . W. H. Preece Esq^r F.R.S
ARTHUR ANDRÖN FRIBA ARCHITECT

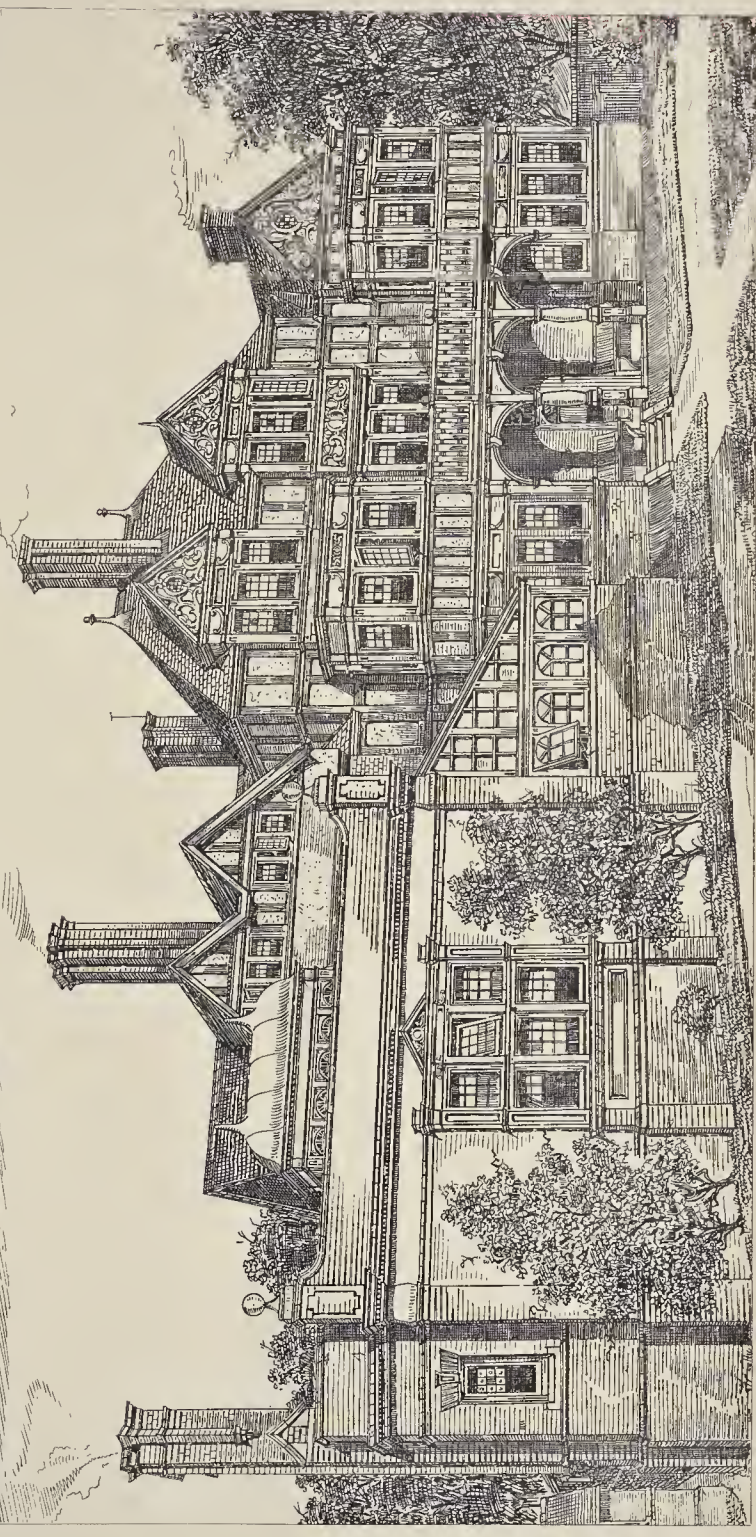
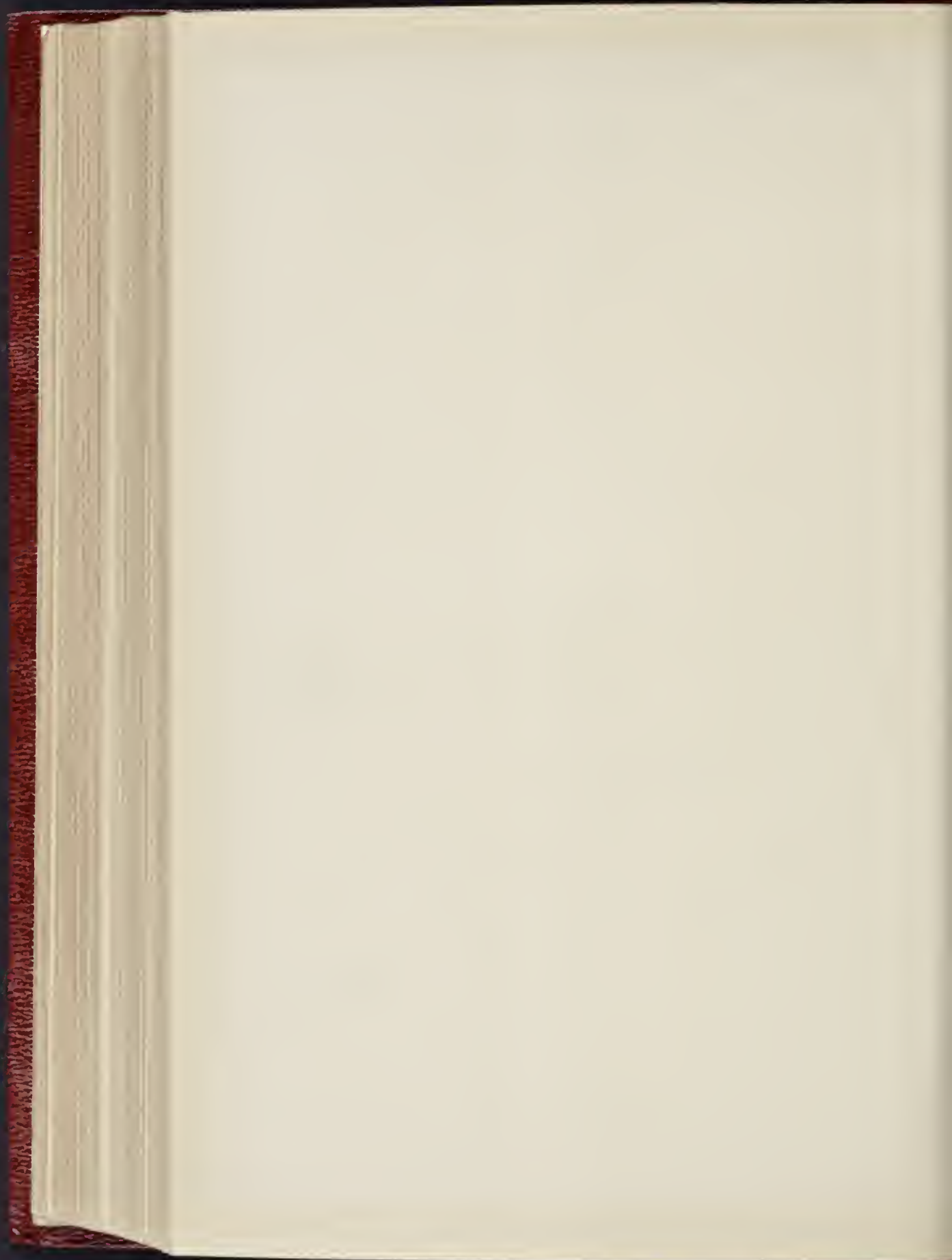


PHOTO LITHO. SPRAGUE & CO. 443 EAST MADISON STREET. CHICAGO, ILL. U.S.A.



at* the date of the delivery of the Tender by the several Trades Unions of the Districts in which the work to be done is, and for this purpose all work to be done on and about

or within twenty miles of Charing-cross, is to be considered as within the District of the London Trades Unions, and the same shall be made to the Form of Contract and the recitals in that Form. The Tender and accompanying documents filled up as before directed must be enclosed in a sealed cover and be delivered at the offices of the Council not later than 1 o'clock on the 189 . No Tender will be received after that time.

FORM OF CONTRACT, SCHEDULE, &C., AS TO WAGES, &C.
Recital.

Whereas on the day of 189 the contractor made and delivered to the Council a tender for [stating purpose and nature of works and amount of tenders] and the Council accepted the same; and whereas the Council, with the intention of preventing the loss and damage which are caused by defective workmanship, and of preventing disputes between the contractor and his workmen, and the consequent delay and loss to the Council, stipulated that it should be, and it was a condition of such tender and acceptance that the contractor should be bound to pay to all workmen employed by him in or about the execution of this contract the rates of wages, and to observe and cause to be observed by such workmen the hours of labour set out in the Schedule hereto, and to perform and observe the stipulations set out in clauses A, B, and C of this contract.

Provisions.

A. The contractor shall at all times during the continuance of this contract abide by, perform, observe, fulfill and keep all and singular the stipulations following, that is to say—

1. The contractor shall pay all workmen employed by him in and about the execution of this contract or any part thereof, wages (and wages for overtime respectively) at rates not less than the rates stated in the Schedule hereto, to which the word relates, and for each and every breach by the contractor of this stipulation, and notwithstanding the condonation of any prior or other breach, the contractor shall on demand pay to the Council as liquidated damages, and not as a penalty, the sum of 5s.

2. The contractor shall observe, and cause to be observed by such workmen, the hours of labour not greater than the hours of labour stated in the said Schedule, and for each and every breach by the contractor of this stipulation, and notwithstanding the condonation of any prior or other breach, the contractor shall on demand pay to the Council as liquidated damages, and not as a penalty, for each day on which any such breach shall be committed, and for each workman in respect to whom it shall be committed, the sum of 5s. per hour for every hour during which, on each day, each such workman shall be employed by the contractor beyond the maximum number of hours stated in the said Schedule, provided that this stipulation shall not be construed to prohibit overtime, if such overtime be in accordance with the rules of the Trades Unions concerned.

3. The contractor shall at all times during the continuance of this contract display and keep displayed upon the site of the works and in every factory or shop or place occupied or used by the contractor in or about the execution of this contract in a position in which the same may be easily read by all workmen employed by the contractor in or about the execution of this contract, a clearly-printed or written copy of the said Schedule hereto, and for each and every breach by the contractor of this stipulation, and notwithstanding the condonation of any prior or other breach, the contractor shall on demand pay to the Council as liquidated damages, and not as a penalty, for each day on which such breach shall be or continue the sum of 1s.

4. The contractor shall, to the satisfaction of the Council, provide and keep proper books, in which shall be recorded and entered from time to time the names of and the wages paid to, and the hours of labour observed by all such workmen as aforesaid, and shall from time to time when required produce and show the same to any person or persons, whether a member or members of the Council or not, appointed by the Council, or by any Committee of the Council to whom the matter or business out of which this contract arises may have been or may be referred to, inspect the same, and allow such person or persons to take copies of, or extracts from such books, or any part thereof, and for each and every breach by the contractor of this stipulation, and notwithstanding the condonation of any prior or other breach, the contractor shall on demand pay to the Council as liquidated damages, and not as a penalty, the sum of 5s.

5. The contractor shall from time to time, if and whenever required by the Council so to do, and within seven days after such requisition, make and deliver to the Council a statutory declaration, stating that all the entries in such books as aforesaid are correct, or, in the case of any inaccuracy therein setting forth the details of such inaccuracy, and that all the entries required by stipulation (4) to be made in such books, have been made therein to the date of such declaration, and for each and every breach by the contractor of this stipulation the contractor shall on demand pay to the Council as liquidated damages, and not as a penalty, the sum of 10s.

6. The contractor shall not, without the written consent of the Council under its Clerk, give any consent may he given subject to such conditions (if any) as the Council may think fit to impose, assign or undertake, in or about the execution of this contract, any contract for the execution or performance of the said works or any part thereof, and for each and every

breach by the contractor of this clause the contractor shall, notwithstanding the condonation of any prior or other breach, on demand pay to the Council as liquidated damages, and not as a penalty, the sum of 500s. [Provided that if, at the time of tendering, the contractor states his desire to sublet a portion of the work not usually done by him, the Council will agree to this subletting to an approved sub-contractor, the principal contractor being responsible for the work being done under the same conditions as if done by himself.]

C. Any sum or sums of money which on breach by the contractor of any one or more of the stipulations aforesaid in Clauses A and B, may from time to time become payable by the contractor to the Council as liquidated damages, may either be recovered by the Council from the contractor by action or other legal proceedings, or may be deducted and retained by the Council out of any moneys due to or to become due from the Council to the contractor under this or any other contract, or the Council may obtain payment thereof, partly in the one mode and partly in the other.

In case of any breach by the contractor of any one or more of the stipulations aforesaid in Clauses A and B, or of any one or more of the provisions contained in the Schedule hereto, it shall be lawful for the Council, instead of claiming payment to them by the contractor of the liquidated damages payable by the contractor as aforesaid in respect of such breach, to determine this contract in the same manner and to the same extent as they have power to determine the same under clause 1 in the events therein mentioned, and if this contract shall be determined under this present power, then all the provisions of that clause shall apply as if this contract had been determined under that clause.

been employed by the sub-contractor beyond the maximum number of hours during which under the terms of the said covenant he ought to have been employed.

And that the sub-contractor shall at all times, during the continuance of the sub-contract, display and keep displayed upon the works and in every factory or workshop, or place occupied or used by the sub-contractor in or about the execution of the sub-contract, in a position in which the same may be easily read by all workmen employed by the sub-contractor in or about the execution of the sub-contract, a clearly printed or written copy of the said schedule; and for each and every breach by the sub-contractor of this stipulation, notwithstanding the condonation of any prior or other breach, the contractor shall, on demand, pay to the Council, as liquidated damages and not as a penalty, for every day during which such breach shall be or continue, the sum of 1s., and that the sub-contractor shall, to the satisfaction of the Council, provide and keep proper books, in which shall be recorded and entered from time to time the names of and the wages paid to and the hours of labour observed by all such workmen, and shall, as required, produce such books to any person or persons, whether a Member or Members of the Council or not, appointed by the Council or by any Committee of the Council to whom the matter or business out of which the sub-contract arises may have been or may be referred to, inspect the same, and allow such person or persons to take copies of or extracts from such books or any of them, provided that no person be appointed, as aforesaid, who is carrying on or is peculiarly interested or employed in a business of the same or a like

THE SCHEDULE.

Rates of wages to be paid, and hours of labour to be observed, by the contractor as regards all workmen employed by the contractor in or about the execution of this contract:—

For all work done within a radius of not exceeding 20 miles, measured in a straight line from Charing-cross.

For all work done outside the said radius the rates of wages and hours of labour recognised at the date of the tender by the Trade Unions of the District, in which district such work is intended to be done, viz.:—

TRADES.

Rate of wages per hour.	Hours of labour per day.	Rate of wages per hour.	Hours of labour per day.
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The foregoing list is believed to include all the trades which the contractor may require to employ in or about the execution of this contract. If, however, he should employ any workman or workmen in any trade not before specified, the rates of wages per hour to be paid to such workman or workmen is not to be less, and his or their hours of labour are not to be more, than those specified in the list. Provided always that all work done on a site within twenty miles of Charing-cross shall be considered as done within the district of the London Trades Unions.

6. There shall be inserted in every contract a clause prohibiting the contractor from entering into any sub-contract without the consent of the Council, and in granting such consent the Council shall require the contractor to enter into an agreement which will secure the observance of the following conditions, viz.:—

That no sub-contractor shall operate to relieve the contractor of his liabilities and obligations, and that the contractor shall be responsible for all the acts, defaults, and neglects of the sub-contractor as fully as if they were the acts, defaults, and neglects of the contractor, and that there shall be inserted in the sub-contract a covenant by the sub-contractor that he will pay all workmen employed by him in or about the execution of such sub-contract rates of wages not less, and observe and cause to be observed by such workmen hours of labour not greater than the rates of wages and hours of labour following, that is to say, as regards all work done upon a site, any part of which is within a radius of twenty miles, measured in a straight line from Charing-cross, the rates of wages and hours of labour set out in the schedule appended to the original contract as applicable to work done within such radius, and as regards all other work such rates of wages and hours of labour as at that date of the sub-contract are recognised and in practice observed by the trades unions of the several districts where the work is done, and that such rates of wages and hours of labour be inserted in a schedule to the sub-contract, but in no case shall such rates of wages be less or hours of labour greater than those set out in the 3rd and 4th columns of the wages and hours schedule of the contract between the Council and the contractor, and that in the case of any breach by the sub-contractor of the covenant as regards rates of wages and hours of labour to be inserted in the sub-contract, the contractor shall for every such breach as aforesaid pay to the Council, as a penalty, the sum of 5s. per hour for each day on which such breach shall be committed, and for each workman in respect to whom it shall have been committed, the sum of 5s. per hour for every hour during which such workman shall have

kind as that carried on by the sub-contractor; and for each and every breach by the sub-contractor of this stipulation and notwithstanding the condonation of any other or prior breach, the contractor shall, on demand, pay to the Council, as liquidated damages and not as penalty, the sum of 5s., and that the sub-contractor shall from time to time, whenever required by the Council so to do, and within seven days after such requisition, make and deliver to the Council a statutory declaration, stating that all the entries in such books as aforesaid are correct, or, in case of any inaccuracy therein, setting forth the details of such inaccuracy, and that all details required by the stipulation lastly heretofore contained to be made in such books have been made therein to the date of such declaration, and for each and every breach by the sub-contractor of this stipulation the sub-contractor shall, on demand, pay to the Council, as liquidated damages and not as a penalty, the sum of 10s.

Provided that this Standing Order shall not be construed as prohibiting the sub-contractor without the consent of the Council from purchasing or sub-contracting for the supply of any materials, articles, or things required for the execution of the contract with the privilege to be purchased wholesale in the market or of wholesale merchants or manufacturers.

Proposed Selected List of Contractors.

"On July 21, 1892, the following proposal by Mr. Beachcroft was referred to us for consideration and report. That Committees charged with the carrying out of works undertaken by the Council be at liberty to invite tenders from an approved list of persons willing to tender for such works, under the conditions imposed by the Council; such list, however, in no case to contain the names of less than seven persons.

We have carefully considered this proposal and have to recommend to the Council as follows:

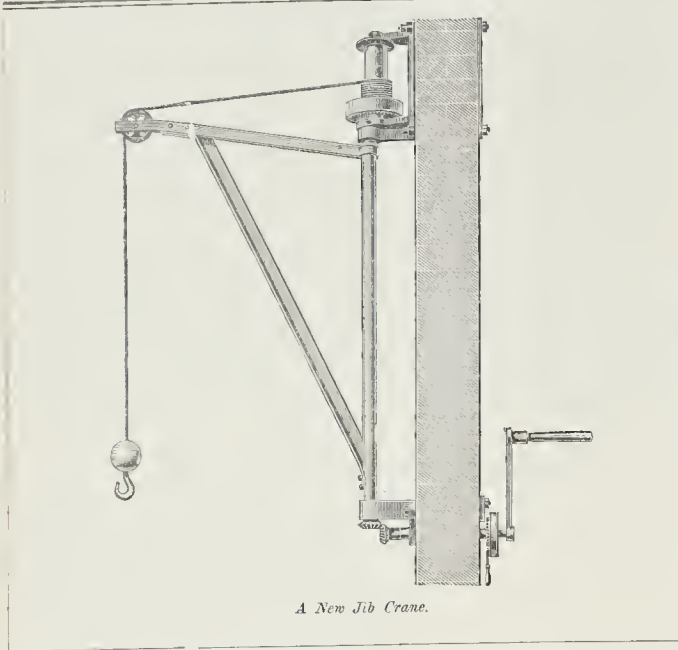
"That it is not desirable to depart from the method of obtaining tenders hitherto adopted by the Council."

A debate lasting nearly four hours commenced with an unsuccessful attempt to rescind Mr. Woderic Harrison's amendment in paragraph 2 in Standing Order 1 (see last week's Builder, p. 478, 479). The proposal to rescind was defeated, as were other amendments, and Standing Order No. 2, as amended last week, was agreed to.

On Standing Order No. 3 (see Builder, p. 479, ante), Mr. Arthur Arnold moved the omission of the words "proved to be." He held that country contractors ought not to be expected to pay London rates of wages.

Mr. Saunders, M.P., expressed the opinion that it would be simply impossible for contractors employing labour at a greater distance

* The words in italics within brackets constitute amendments which were agreed to in the course of the discussion of these documents in detail.



A New Jib Crane.

A NEW JIB CRANE.

than twenty miles to fill up such a schedule as that proposed.

After some discussion the Council divided, and there voted—For the amendment, 40; against, 52; majority against, 12.

The amendment was accordingly negatived, and the recommendation adopted.

On Standing Order 4,
Mr. Pearce moved that consideration of this proposition should be deferred until the result of the preceding recommendations had been ascertained.

It was decided to refer the recommendation, and the part of the report pertaining thereto, back to the Committee.

Mr. Ward moved the addition of the following Standing Order—

"That when there is no trade union to fix a minimum wage the Council itself shall fix it."

Mr. Frederic Harrison, while expressing his accord with this proposition, suggested the addition of the following words:—

"But that there shall not be on the Council's list any rate of wages less than 6d per hour for men, or any hours of labour more than ten hours per day."

At the suggestion of the Chairman, this matter also was referred to the Committee. The Council then discussed and agreed to the form of contract, &c., making certain amendments, most of them consequential upon Mr. Harrison's accepted amendment. These amendments are indicated by italics within brackets in the foregoing report.

At the ordinary weekly meeting of the Council on Tuesday last, there was little or nothing calling for mention in these pages. After sitting for five hours, the Council adjourned until Tuesday, January 17, 1893.

CHICAGO EXHIBITION.—The Royal Commission for the Chicago Exhibition are arranging for a series of introductions to the different sections of the Catalogue of the British Section. Amongst those who have promised to contribute articles are: Sir Douglas Galton, on "Railways;" Prof. Francis Elgar, "Ships and Shipping;" Prof. Roberts-Austen, "Metallurgy;" Prof. Le Neve Foster, "Mining;" Mr. W. H. Preece, "Electricity;" Mr. Ernest Clarke, "Agriculture;" Mr. Thistleton Dyer, "Horticulture;" Prof. Ray Lankester, "Fisheries;" Mr. R. Marston, "Angling;" Sir George Birdwood, "India;" Mr. Fuller Maitland, "Music;" Mr. H. Graham Harris, "Engineering;" Capt. Abney, "Photography;" Mr. Reginald Hooker, Assistant Secretary of the Statistical Society, "General Manufactures." The general introduction to the Catalogue will be written by Sir Henry Trueman Wood, the Secretary to the Royal Commission.—*The Athenæum*.

HANDY cranes for light loads to be raised by manual labour are most useful adjuncts to warehouses, particularly those of the smaller classes. Those in current use are generally too heavy and massive, and present another serious defect,—the open hole made in the wall for the chain or rope. This last imperfection is a serious one in corn and other stores, where access of the external weather is liable to do injury to the goods within.

The new jib crane produced by Messrs. Abbott, of Newark-on-Trent, is a most practical contrivance, which remedies or avoids the common defects of ordinary hoisting appliances. It is simple and inexpensive, and is, moreover, perfectly safe in working. Its compactness and lightness cause the least amount of dead-weight on the wall; and, indeed, it can be fixed to an independent upright beam or post if so desired. The woodcut above shows the new crane in its simplest form. The brackets which support and hold the crane externally are bolted right through the wall. Below the foot-plate are seen externally two bevel-wheels. The spindle of the pinion passes through the wall, and is worked by a handle inside the building. The other wheel is attached to a shaft working within the tubular upright of the crane, as in a sleeve. The head of this shaft is connected with a vertical winding drum within the grasp of the top external bracket, which, like the foot-plate, is secured by bolts passed clean through the wall. Everything thus communicating between outside and inside is a close fit, admitting neither damp nor draught. The jib is supported by a stay. The whole gear is made of steel; and of varying capacities to lift from 2½ cwt. to 5 cwt., 10 cwt., and a ton. The handle attached to the pinion spindle being inside the wall, a valuable economy of internal floor-space in the hoisting operation is afforded. For ordinary winding with the handle alone a simple and convenient brake connected with the external drum gear can be put in action by a pull-rope hanging down inside the wall within reach of the hoister. But when the goods require careful treatment, and speed of lift is not required, a worm-wheel can be added, which works with the utmost smoothness and which will hold the weight of goods in operation at any point where they are simply allowed to rest. This worm-wheel works itself out of gear whenever the pressure of the load is relieved by its deposit at its destination. The spindle of the worm-wheel, like all other portions of the crane, is fixed without any open office in the wall. The two smaller sizes of the crane are worked by the simple bevel-

gearing at quick speed. The two larger sizes have both bevel and worm gearing, either being applicable at will. Nothing can be safer than the worm-gearing, for the load will not run down if ever the handle slips off; but it is too slow in speed for ordinary use, unless where the goods being transferred are liable to damage from shocks.

Books.

Die Mysterien Heiligtümer in Eleusis und Samothrake, von OTTO RUBENSOHN. Mit zwei Plänen und mehrere Abbildungen im Text. Berlin. 1892. Gaertners Verlagsbuchhandlung.

IN its original form as a prize essay written for the Kaiser Wilhelm's University at Strassburg, the treatise before us dealt generally with the topographical and architectural conditions of Greek sanctuaries in relation to ritual customs. In republishing his essay, Dr. Rubensohn has wisely cut it down, and limited his subject to material more easily compacted, *i.e.*, to the treatment of the two most important "mystery" sanctuaries of ancient Greece, *i.e.*, Eleusis and Samothrace. For completeness sake, we could wish he had added an account of the Kabeiroi Sanctuary near Thebes, to which, of course, he makes constant reference. As regards Eleusis his work is of special value to the reader, who may prefer his very lucid German to the heavy task of wading through the modern Greek account in the *Praktika* and *Ephemera* of the Athenian Archaeological Society. Plans of the excavations at Eleusis and many isolated particulars have filtered through into guide-books and popular works, but Dr. Rubensohn aims at something much more complete. He gives a full and exact account of each of the successive restorations of the sanctuary, and deals with these restorations in relation to the modifications of ritual that occurred from time to time. Nothing is more tempting than to conjecture in that time-honoured field of hypothesis the "Eleusinian mysteries," but Dr. Rubensohn keeps rigidly to facts,—facts as attested by actual monuments, above all by inscriptions.

Samothrace is dealt with in the same fashion. Probably few educated persons not specialists know anything definite about the ritual practices there, or, indeed, the monuments discovered in Dr. Conz's excavations, though the *Niké* of Samothrace is familiar to every visitor to the Louvre. Dr. Rubensohn puts his finger at once on an architectural feature that distinguishes all genuine mystery cults. The mystery temple contains within the actual sanctuary a sacrificial trench; it is so at Samothrace, it is so at the Kabeiroi sanctuary near Thebes. Ordinary Greek temples have an altar, not a trench, for sacrifice, and this altar is outside the *naos*, not within. The conclusion is obvious,—the trench denotes a *chthonic* worship,—the Kabeiroi worshipped at Samothrace, whatever else they were or were not, are *chthonic* divinities. This is but one example of a method exactly applied through all the various phases and developments of the Samothracian cult down to imperial times.

Account-Roll of the Priory of the Holy Trinity, Dublin, 1337-1346. Edited by JAMES MILLS, M.R.I.A. Dublin: University Press.

THIS was a small but apparently wealthy religious house, for, while the number of the brethren seems not to have exceeded eleven, its income reached something like 250*l.* a year. This would equal in our money nearly 4,000*l.* The roll is interesting, not merely because it throws light upon the cost and character of conventual life in the fourteenth century, but also because we gather a good deal of information from it as to the management of farms, and the payment of workmen. Ordinary laborers were paid 1*d.* a day; but if permanently employed they rarely received money. Their wages were paid in the shape of allowances of corn, fixed by statute. Carpenters were hired generally at 2*d.* a day, with board, and smiths at the same rate. The cellarer of the priory enjoyed a good revenue; but though wine figures frequently in the accounts, it does not seem to have been bought in large quantities at any one time. Annexed to these accounts (which have been translated and

annotated by the erudite editor) is the copy of a curious poem or morality, found written upon the unused parts of the roll, and ascribed to the middle of the fifteenth century. It is without a title, but the editor suggests "The Pride of Life" as an appropriate index to its contents.

Labour Contracts: A Popular Handbook on the Law of Contracts for Works and Services. By DAVID GIBBONS. Fourth Edition. By T. F. ATLEY, Solicitor. London: Crosby Lockwood & Son. 1892.

THIS is a sensible book, but as it has now reached its fourth edition it needs no long notice in these pages. It is, in fact, a work upon what may be called contracts for work and contracts for service, as, for instance, contracts between a house-owner and a builder, and contracts between a house-owner and his servant. At the end will be found various statutes relating to these subjects, such as the Factory and Workshops Act, 1891, and some useful forms of agreements and contracts. In fact, the book is a handy and compact volume, with much legal information. Should another edition be published, we would recommend that the index be enlarged. For example, there is in the book a certain amount of information as to arbitration, but in the index, under the head of "Arbitrator," we find only "Arbitrator, see of, 109," which is singularly meagre. Again, it would facilitate the use of the book if marginal notes were inserted by the side of the text. This often saves much time when reference has to be made to a work of this kind.

Paving and Making Good Private Streets. By WILLIAM SPINKS, A.-M. Inst. C.E. Third edition. London: E. & F. N. Spon. 1892.

THIS is the third edition of a very practical and useful work. It is an exposition, in plain terms, of the 150th section of the Public Health Act, 1875, which empowers Urban Authorities to compel the paving, &c., of private streets at the expense of the adjacent owners. Probably no clause in this famous Act has caused more litigation; and the light thrown upon it by the interpretations of the various Courts forms an excellent sarcasm on the English law.

The principal ambiguity of the clause rests upon the definition of a street given in section 4 of the same Act, and we cannot help being reminded by it of the railway passenger who took a tortoise into the carriage with him, and was asked to produce a ticket. On his refusal, the station-master was appealed to, and he gave the following judicial decision, dismissing the case: "Dogs is dogs; cats is dogs; and monkeys is dogs; but tortoises is insects."

The work has been carefully brought up to date, and the various amending or modifying clauses and cases excellently arranged.

Medun. By W. M. FLINDERS PETRIE. London: David Nutt. 1892.

THIS is the last of the annual volumes which, for several years past, Dr. Flinders Petrie has published to record the results of the previous year's explorations in Egypt. After having investigated various sites of varying dates, he proposed to himself, in 1891, the task of examining the peculiar-shaped pyramid in the midst of the cemetery at Medun, about forty miles to the south of Cairo. This is well known for its supposed remote antiquity, the intention being to search for the most ancient of Egypt's monuments in order to determine, as far as possible, the origin of some of the types and conventional forms so common in the works of later date, and so familiar to students. The cemetery contains a great number of tombs, among which the sepulchre of Nefermat, with its remarkable scoloptores, is the best known, while the lofty pyramid close to it, rising high above all surrounding objects, is a conspicuous feature above the sandy plains, not only on account of its height, but from its broken summit and the peculiar steps, which give the monument a curiously unfinished aspect, and which, as has been proved by the excavations, strangely transform the original appearance, although they are now shown to indicate the mode of construction.

Having collected many of the workmen of previous years, Dr. Petrie took up his abode in Nefermat's sepulchre, and proceeded to make an excavation of considerable size in the mass

of rubbish and fallen material which entirely cover the base, and which rise to a considerable height around the pyramid. We are given some graphic details of the nature of this heavy work and of the character of the workmen, who, working piece-work at 1d. to 1½d. per cubic yard, according to the hardness of the ground, will yet, man and boy, earn together 1s. 6s. to 2s. per day between them; and with only the poor local implements will move from 15 to 20 cubic yards as a common day's work. We are sorry to hear that these wages are about double the Fellah's usual rate of pay.

Search was first made for the small temple which appears to be a constant adjunct to all these structures, and which was found beside this pyramid, doubtless one of the first that was erected. It was found nearly perfect; it proves to be the earliest dated building in the land at present known, and it has survived all the various rebuildings and vicissitudes of the other Egyptian monuments. The date, which applies equally to the bulk of the pyramid, is made out indirectly. There is neither ornament nor inscription upon the original work, but there are various additions in which the founder, Seneferm, is mentioned. These are not alone of the Eighteenth Dynasty, but in periods nearer to his own time. Seneferm is a well-recognised king of the Fourth Dynasty; and the later Egyptologists have assigned the all but incredible period of about 4,000 years before Christ to his reign—a date which, it must be remembered, is that of the creation of Adam, according to the usual chronology.

The dates assigned to Egyptian antiquities naturally have been, and will be, challenged, and there are important differences of opinion among Egyptologists; but the student soon becomes convinced, from the clearness of the records on the solid granite of the buildings themselves, that the usually recognised dates assigned for the beginnings of things have to be set back materially,—so far, at least, as Egypt is concerned. The value of the book before us is greatly enhanced from its unfolding to us a clear record of the condition of the human race in Egypt, and of their proficiency in the arts and of their mode of daily life at this remote period.

The pyramid has been found to be an earlier counterpart of the Great Pyramid at Gizeh, and erected in the same ratio of proportion of height to circuit. It has the same angle of inclination,—namely, 51 degrees and a few minutes. The Temple is on the east side. The height has been 301 ft. 7 in., and the base 473 ft. 6 in., there being a small discrepancy of a few inches only in the lengths of each side. The sides face the cardinal points. The workmanship is excellent, showing remarkable proficiency on the part of the artificers. But the angle of inclination does not appear. It has only been disturbed by Dr. Petrie from the mass of rain fallen from the summit. The upper part, where it has not been removed, for the monument has been used as a quarry by the later kings,—shows various faces of worked stone, one below the other, and laid at an acute angle. These afford to our author the secret of the original construction. The pyramid is found to have been erected around and above the primitive mastaba which encloses the sepulchre. A mastaba is a low, flat-topped structure,—in this case, as in many others, with sloping sides. Its form, it need hardly be said, presided that of the pyramid. In this instance it has been covered over with successive layers of stone, of which seven have been counted, at a somewhat later period, parallel to the acute slope of the sides, and finally the whole was covered by the flatter slope already referred to. In the pyramid at Gizeh, erected by Seneferm's successor, and in later ones, the intermediate slopes were omitted. The pyramid was surrounded by a peribolos wall, traces of which alone were found. The sepulchre within the pyramid had been rifled in some remote period.

Several of the tombs in the vicinity were examined, and outside one of them, with sloping sides, an outer surrounding wall was found, on which were drawn at each of the angles the sight lines to guide the workmen for the formation of the sloping sides of the building. In another the author tells us how he copied the paintings, not with wet paper, as others had previously done in part, to the great injury of the colours, but by a system of tracing on dry paper. The paintings entirely cover the walls, and the mass of work involved can readily

be conceived. The sheets were afterwards put together, and the results are before us, some of the many plates being prepared by process from these actual drawings.

The tools used by the workmen were of bronze, of usual type,—adzes and chisels have been found. But there is no indication of infancy in any of the arts. All are found in full development on this prehistoric site. These are the earliest works yet found of this remarkable people. The commencement of things appears as far off as ever.

The book is full of minute details of the discoveries made, and its pages, enriched by a goodly number of plates, many in colours, reveal the forms of the pottery found, the earliest shapes of hieroglyphics, the designs of ornamental columns, and a mass of information which comes to us as a revelation of the remote past. The beauty of the objects found would alone make the illustrations of interest, but the extreme antiquity of the objects will cause this volume to be sought after by everyone who takes an interest in the early history of the human race. It has to be added that the whole of the plates are from drawings made by the author, who has evidently worked as hard in the preparation of this volume as he must have done to recover the results from the buried mass. There are chapters on the inscriptions found by F. L. Griffith, on the varieties of ancient "Kohl," by Dr. A. Wiedemann; on the colours by Dr. W. J. Russell, F.R.S., and on the Papyrus of Coptic date, by W. E. Crum.

We commend this most interesting and important book to the attention of our readers.

NEW DIRECTORIES.

"The Post Office London Directory for 1893" (London: Kelly & Co., Ltd.) is the ninety-fourth appearance of that bulky and indispensable compilation. It is, as usual, corrected close up to date of issue, and an improvement has been effected by colouring the new map, showing the boundaries of postal districts and of the course of the main arterial roads at a glance. The mistake which we pointed out last year in the name of the new park between North Brixton and Camberwell has been corrected on the map, and instead of "Ingall's Fields" it now reads correctly as "Myatt's Fields." The price of the directory is 3s.

"The Australian Newspaper Directory" (London: Gordon & Gotch) is now in its third edition. It is a very useful handbook, giving the names of Australian and New Zealand journals and of the towns where they are published, and containing several maps and statistical and other notes about the Australasian colonies. Messrs. Gordon & Gotch are so well known in connexion with Australian newspapers that the directory may be accepted as reliable.

ALMANACKS AND DIARIES FOR 1893.

Messrs. Hodson & Kearns, of 83, Southwark-street, send us, as usual, a parcel of their excellent diaries for the use of architects and builders. We have so often spoken favourably of the merits of these productions that it is unnecessary here to expatiate upon them. We can especially recommend "The Architect's Diary," Nos. 12 and 13, "The Builder's Diary," No. 11, and a useful general "Diary and Notebook" No. 9. They are all full of useful information, and are well arranged and printed. The same firm also send us some specimens of their calendar and date-indicating blotting-pads, in various sizes and styles, but we prefer those with the white blotting-pads, for in our experience the pink pads are a little lacking in absorptive power.

"Quantity Surveyors' Tables and Diary," for 1893, revised and re-written by A. Fellow of the Surveyors' Institution (London: Metcham & Son) is a very useful little book for the pocket. It is clearly arranged and indexed, is well printed, and gives nearly sixty pages of memoranda which will be found very useful to architects and surveyors. It is sold for 6d., or with leather cover, 1s.

"The British Almanac and Companion" for 1893 (London: The Stationers' Company) contains, besides the calendar, astronomical notes, and the usual contents relating to public offices and departments, a list of Acts of Parliament passed in the last Session, with abstracts of the more important ones. There are also lists of County officers, the year's Ordinary, and infor-

mation as to State pensions, emigration, and the government of foreign countries. Mr. H. Langton Cole contributes his usual review of the Architecture of 1891-2. At the outset he refers to the "art, or profession" controversy, and expresses the hope that however the dispute may be settled, neither the artist nor the practitioner will be, by official regulations, exalted over the other. "The public," he says, "has need of both, and perhaps likes best the man who best combines the qualities which each seems indispensable." The article enumerates and describes the principal London and provincial buildings commenced or completed during the year. Mr. Cosmo Monkhouse reviews the Art, Mr. Joseph Knight the Drama, Mr. R. Langton Cole the Engineering, Mr. T. Percy M. Betts the Music, and Mr. E. W. Blamder the Science of the year 1892. The price of the "Almanac and Companion" is 2s. 6d.

"The Railway Diary and Officials' Directory for 1893" (London: McCornodale & Co.) provides, for a shilling, a large amount of authentic and official information concerning railway management and statistics. It contains lists of directors and officers of all the independent lines of railway in the United Kingdom; the weekly traffic returns for 1892, with blank columns for filling in those of 1893, abstracts of four half-years' accounts of some of the principal companies; and a great variety of other information likely to be useful not only to shareholders, but to business men generally. The "Railway Almanac," published at the same office, is a useful sheet for the wall.

"The City Diary, 1893" (London: W. H. & L. Collingridge, City Press Office) is the thirtieth annual issue of a very useful diary, almanac, and handbook. It contains a great deal of information (not so readily to be found elsewhere) relating to the Corporation of London and City institutions and officers. It also includes a list of City parishes and churches, with the names of the clergy and vestry clerks. It contains much other business information, and the diary is interleaved with blotting-paper. It is sold for a shilling.

"Calvert's Mechanics' Almanac and Workshop Companion" for 1893 (London and Manchester: John Heywood) is the twentieth issue of a very useful little book, full of notes and memoranda. It is sold for fourpence.

Chubb & Son's Lock and Safe Company send us a specimen copy of a neat and well-got-up pocket-diary which they are issuing gratis to architects, bankers, and others.

Correspondence.

To the Editor of THE BUILDER.

DRAWINGS OF SIR C. WREN.

SIR,—In the number of the *Builder* for September 12, 1891, was inserted a memorandum of mine relating to "The Family of Sir C. Wren." While looking through the list of books in Sir John Soane's Museum, a few days since, I observed a small, bound volume containing the sale of coins and other antiquities, the property of his son, and sold by order of the executors. In the first day's sale were inserted the drawings of Sir Christopher. I formerly found a reference that a "Sale of Drawings" was effected on October 26, 1748; I cannot refer to the authority for this date, which is some months earlier than that of the catalogue; and in this catalogue I herewith send you a copy of the title-page, as well as of the lots, deeming the whole to be of much interest. Most of the lots are priced; and these prices appear to me to be insignificant as if the drawings had been sold at the present day. What are they worth now? I do not know if the list has been before printed. Some member of the profession who has seen the collection at Oxford might be able to say if any of the lots are deposited there. Perhaps those not priced may have been bought by another purchaser, and should be found elsewhere. Possibly there were two sales of drawings,—1748 and 1749.

"A Catalogue of the Gænnine and Entire Collection of Curious Greek and Roman Medals and Medallions in Silver and Brass, Antique Marble Statues, Busts, Urns, and Inscriptions, Bronzes, Gems, and other Curiosities of

Christopher Wren, Esq.; Late of Hampton Court, Deceased; together with the Collection of Drawings of Architecture of the late Sir Christopher Wren, his Father, which will be sold by Auction, By Mr. Langford (By Order of the Executors), At his House (late Mr. Cock's) in the Great Piazza, Covent Garden, On Tuesday, Wednesday and Thursday, the 4th, 5th, and 6th of April, 1749."

The collection was on view from Friday, 31st March. There were 94, 86, and 84 lots respectively.

Drawings of Architecture by Sir Christopher Wren.

Lot 30. Eighty-two Designs and two Prints of St. Paul's Church (most part), pasted into a Portfolio. (19s.)

Lot 31. A Hundred and fourteen large and finished Drawings of St. Paul's, Bow, and other Churches in London; also the Monument, Whitehall, Winchester Castle, Trinity College, Cambridge, &c., and three Prints; all pasted into a large Book. (27. 10s.)

Lot 32. Thirty-two very large Drawings of Whitehall, Windsor, and Greenwich Hospital, in a Portfolio.

Lot 33. A Book of Astronomical Schemes.

Lot 34. An hundred Drawings and Sketches of London Churches, in a Portfolio.

Lot 35. Sixty-six Drawings of Hampton Court, all pasted into a Book. (24. 1s.)

Lot 36. An Hundred and two Drawings and Sketches of Kensington Palace, and Miscellaneous Architecture, in a Book. (11s.)

Lot 37. An Hundred and one ditto, in a Cover. (17. 5s.)

Lot 38. An Hundred and thirteen ditto, in a Portfolio. (6s.)

Lot 39. Sixty-nine ditto, of Hampton Court, Warwick Church, and other Buildings, in a Cover. (5s.)

Lot 40. Seven large finished Drawings of St. Paul's, one of the Monument, and a Ground Plan of London after the Fire. (24. 8s.)

Lot 41. A large Portfolio containing finished Drawings of the Hôtel des Invalides at Paris; all pasted in, except two.

Lot 42. An Hundred and Fifty Drawings and Sketches of Winchester Palace and Miscellaneous Architecture; with a Parcel of Papers relating to the Subject, in a Portfolio.

Lot 43. A Large High-finished Drawing of St. Paul's.

Lot 44. A ditto of the Inside of St. Paul's.

Lot 45. A large ditto of an Intended New Palace at Westminster. (24. 4s.)

It would be desirable to trace the whereabouts of Lot 41; it might show distinctly what were the intentions of the architect in regard to internal decoration. Lot 30 may comprise the series of drawings now at the Chapter-house under the care of Mr. Penrose. WYATT PAPWORTH.

December 7, 1892.

ORIENTATION OF CHURCHES.

SIR,—Having obtained an Ordnance map of the 1-500 scale of the survey of 1879, it is there seen that the axis of the south aisle of St. Mary's Church, Truro, points about 5 deg. to the south of east.

As there is no day, so far as I can ascertain, of several set apart to St. Mary the Virgin (for that I am given to understand is the Mary alluded to), on which the sun's azimuth at rising is 5 deg. south of east, it is therefore suggested that, as that is its rising point for St. Michael's Day, the Perpendicular masons, whilst dedicating their building to St. Mary, were influenced by the position of the foundations of an older building, so that their work, as well as that of the nineteenth century Cornish cathedral, whose axis is parallel with the aisle of the church, is oriented for St. Michael's Day.

This suggestion is based upon the idea that the original Medieval builders so laid down the axis, it setting out the walls of a church, that it should point to that place upon the horizon where the sun rose upon the day of the saint to whom they were about to dedicate the building.

That this was invariably the case would, it is thought, be difficult to prove, for this reason amongst others, that much confusion has probably been caused by re-dedications, but the three following instances, selected from about forty churches which have been noted recently, tend to show the existence of such a rule as has been referred to.

The three churches alluded to are dedicated to St. John the Baptist, viz., the parish churches of Wellington and Heathfield, Somersetshire, and the priory church of Llanthony, Monmouthshire, and the orientation widely differs in each case.

At first sight this might seem to confirm the suggestion made in a standard work of refer-

ence, not thirty years ago, "that orientation has had no graver origin than carelessness, ignorance, or indifference," but a closer examination, it is thought, will support quite an opposite view.

The church of Wellington, as taken by the compass, and allowing for the magnetic variation westward, has a bearing of about 38 deg. to the north of east, which is about the true azimuth of the sun at rising on June 24, the Nativity of St. John Baptist, and there is a further local reference to the same personage by a town-fair being held on that day.

The church of Heathfield, which was formerly in the patronage of the Prior and Brothers of St. John of Jerusalem in London, has a bearing, as taken by the compass, of about 14 deg. to the north of east, which corresponds with the point of sunrise on August 29, the day on which St. John Baptist was beheaded.

The priory church of Llanthony has a bearing of about 5 deg. to the south of east, as taken from the 1-2500 Ordnance map of the Survey of 1880, and this latter observation requires a little explanation, as the Conception of St. John Baptist, September 24, a day not found in the Anglican Calendar, but in another, seems to be the day referred to.

On this day the sun rises about 2 deg. south of east, but if the increasing error of the Julian mode of reckoning is taken into account, it will be found that early in the twelfth century, at the date of the building of the church, it amounted to nearly six days, so that the bearing of the sun at rising on September 24, at that period, would be about 5 deg. instead of 2 deg., if the correction had been made, south of east; and that there was a reason for following the day indicated by the civil year, instead of correcting it to agree with the natural year, will be shown presently.

The parish church of Llanthony, which adjoins the ruins of the priory, and was formerly connected with them, is dedicated to St. David. The bearing of its axis, as taken by the compass and corrected, is about 12 deg. south of east; therefore the building is oriented for March 1, St. David's Day.

Here it is thought that David, the patron saint of Wales, built a cell early in the sixth century, and spent a probationary period in solitude before he became Archbishop of Caerleon-upon-Usk, and transferred his see thence to Menevia, the present St. David's.

The name Llanthony in its first syllable indicates in Cymric an inclosure, a church, and it has been held that the whole is a corruption of *Llan Dewi'sant Honddŷ*, i.e., church of David in the Vale of Honddŷ, the latter word signifying Blackwater, being the name of the adjacent stream in this Valley of the Black Mountains.

Here, possibly on the actual site of St. David's cell, William, a military retainer of Hugh de Lacy and Eriusius, Chaplain to Queen Maud, retired A.D. 1103, and built a church where shortly afterwards was settled a Priory of Canons-regular of the Order of St. Austin, dedicated to St. John Baptist, of which Eriusius became first prior. The chancel of the present parish church probably contained the whole of the first church, as is indicated by its orientation and in other ways; the present chancel archway being its western entrance doorway; and the nave added later.

It is remarkable that these canons, while retaining the original church, and perhaps, on account of the supposed sanctity of its site connecting it with their infirmary, should not have placed their buildings generally, and their much larger and handsomer church, the structure of which can still be traced, parallel with it, but at an angle which, according to the map, differs by about 7 deg. from the bearing of St. David's Church.

As there is apparently no other reason but that connected with orientation, why the monks, instead of making all the buildings parallel to each other, built them on two converging lines, it is instructive to notice that when they seemingly determined to connect St. John Baptist with the Priory Church of St. David, they selected one day of three, dedicated to the first-named saint, and that not in the Anglican Calendar, which would produce the least difference of angle between the two axes, and further, by not correcting the error in the Calendar for September 24, early in the twelfth century, they reduced that difference, although still expressing it sufficiently to show their meaning, to about 7 deg.

J. HOUGHTON SPENCER.

Taunton, December 10, 1892.

COLOUR COPYING.

SIR,—With reference to the point raised in your last issue about the permanency of the colours and inks used in the new industry, it is, as you say, a matter of the first importance, and as such it has had our serious attention. We claim that, after a great deal of trouble, we have arrived at a solution of the problem, and that we are now supplying colours and inks which are practically fast and permanent.

W. DURRAN,

Secretary, Colour Copying Co.

ANTHRACITE COAL.

Sir.—Before pursuing this matter further, perhaps I may be allowed to explain my position. I am not a monopolist in anthracite, nor have I any desire to create a "corner" in that product. My interest as a general coal dealer is such that I can foresee,—or think I can,—such legislative enactments as might hamper the trade and cause much inconvenience and discomfit to the public, if they are not provided for beforehand.

I observe with considerable satisfaction that, with regard to the abstract question of the claims for anthracite as a smokeless and useful fuel for domestic consumption, your views, Sir, appear to accord with my own. This is no small matter, for, so far as my experience goes, I find a strange lack of knowledge of even the component parts of the mineral. Moreover, if I may put it in this way, you have pointed out the necessity of breaking anthracite into small pieces. Will you allow me to add that this very requirement will be a guarantee that only pure anthracite will reach the domestic market. If the public in future decide to buy any but broken and spoiled the exploitation of rubbish will break and the necessity of the matter will hardly pay mine proprietors and future sinkers in South Wales to erect the necessary machinery to break inferior stuff, which would sooner or later be left on their hands. Then the London dealer would have his connexion to consider.

Concerning the important question of supply,—and its correlative, that of demand,—I do not suggest that anthracite should be used for all purposes. This, therefore, narrows my reply to its domestic use. Again,—as it is necessary in all reforms to begin somewhere,—it is in the metropolis that the loudest complaints have been made of the smoke and "soot" nuisance, and where possibly the first efforts to abate it will be made. Now, how do our anthracite supplies stand with regard to London, which appears to me to be the first, the natural, market? You very truly observe that there is a good deal of guess-work about geology. As a matter of fact, the anthracite output of South Wales has increased of late years to a very remarkable degree. There is an obvious difficulty in tracing the tonnages in our own mineral statistics, but I am endeavouring to collect a few well-authenticated figures. But nearly all this output has gone abroad, including some parts of America and Canada,—why should we not have it in London? Depend upon it, there is a very large body of anthracite in the three Welsh counties where it has been traced. So far, entirely through want of knowledge, no encouragement has been given to the business at home. Sooner or later there will be a change, and it is not at all improbable that the recent,—very recent,—history of Welsh coal-mining, which has caused Cardiff to eclipse Newcastle, will in part be repeated at the more western ports of Swansea, Llanelly, &c. In any event, the question of price will settle itself. If anthracite should reach a prohibitive figure, I for one should not attempt to sell it.

Your correspondent, "H. F. H." (p. 464, ante), will I think, find sufficient answer in your own article, especially in the American figures quoted. As to Mr. R. F. Barnes' objections (1) a good deal might be said on the use of anthracite in manufacture; (2) every well-made grate has a good draught, or one can be secured by simple and inexpensive means; (3) tests have proved that a stronger iron room from anthracite than from any other high-class coal both tried in the same modern grate with vertical bars.

R. S. RICHARDS ("R. S. R."),
London Manager of the Gwann-ae-Gurwen Colliery Company.

"BENNETT'S" HYDRAULIC SELF-CLEANSING STREET GULLY.

Sir.—In your last week's issue you publish a description, accompanied with a woodcut, of what is said to be an invention by Mr. W. B. G. Bennett, C.E., Southampton, and termed an hydraulic self-cleansing street gully. Without troubling to make the usual remarks as to the patent, library, or making any inquiries, he is said to be making and fixing them for the Corporation at Southampton.

To do justice to your readers you will, by kindly inserting this letter, let the public know this invention was made and patented by me in 1834 both in England, France, and Germany, and fully illustrated and described by you in your paper issued July 2, 1837, with recent improvements introduced.

I need scarcely say the apparatus was exhibited by me in action to many thousands of people at the late Invention Exhibition in 1855.

Corporations from many parts of the country were disposed to give it a fair trial, but at present remains in abeyance. I hope very shortly to put some down for trial, when it will be seen in operation in London and elsewhere.

W. B. POWELL.

** We have referred to the description and diagram of Mr. Powell's machine, under the date given, and find that the main principle is certainly that of Mr. Bennett's machine, though there are some differences in the details.

The Student's Column.

CONCRETE.—XXVI.

WALLS.

THE use of concrete for walls has not extended as rapidly as was anticipated by men who wrote and spoke about the material twenty or thirty years ago. Several causes have combined to hinder architects from adopting it. Prominent among these are the dangers arising from its manufacture by careless workmen and unscrupulous contractors, the difficulty and expense of moulding it to carved or irregular forms, and the bald appearance and unlovely colour of the material itself. The erection of a concrete building is an event requiring a fresh study of nearly every detail. The insertion of brick or stone quoins and window dressings, or of projecting features of any kind, is fraught with difficulty. The points of attachment for joinery, &c., must be considered before the walls are begun; and in a hundred ways thought must be exercised or the building may prove more or less a failure. Other objections to concrete walls are their homogeneity and hardness, which render the hanging of pictures and the fixing of plugs difficult tasks, and which make alterations a costly affair (this last is raised as an objection sometimes, but may perhaps be regarded as an advantage); the ease with which sound is transmitted through concrete walls is certainly a point against them; but it may be said, on the contrary, that good concrete is considerably less pervious than brickwork and some kinds of stone, stronger and more durable, and, under certain circumstances, much cheaper. The matter of cost, however, is one which cannot be settled off-hand; so much depends upon the distance which brick or stone, or, on the other hand, the

erected in the latter half of the twelfth century, are concrete-walls from 11 ft. to 14 ft. in thickness at the base, the aggregate consisting largely of flints.

Apparently the first attempt in this century to use concrete on a large scale was made about 1835 by Ringer, who built a graving dock and sea-wall at Woolwich; the concrete consisted of grey-stone, or of hydraulic lime and gravel, mixed with hot water. Mr. Bernays sent in 1880 that the sea-wall was "a few years ago in remarkably good condition." Cottages of Roman cement concrete were built at Herwich in 1841, and Bridgewater in 1846, of Medina-cement concrete near Osborne (Isle of Wight) in 1852, and of Portland cement concrete in the Isle of Thanet in the same year. The last were, according to Mr. Drake, perfectly sound and free from damp in 1872. In 1865 Mr. Tall patented a concrete-building apparatus or framework. In 1868 Mr. Drake patented his iron apparatus, and in the following six years "thousands" of buildings, including mansions, houses, churches, chapels, warehouses, mills, &c., were built by means of it. Besides these, many other patents have been taken out for such appliances, among which we may name those of Osborne, Lish, Potter, Henley, and Broughton. We fear that many of them have been more ingenious than useful, and have proved of little benefit to their inventors.

The principal parts of all building-frames for concrete walls are the "standards" and the "shutters" or movable panels. The standards are usually of wood, sometimes of iron, and are of any convenient length. We do not think it necessary to enter into the details of the different patented apparatus; it will be sufficient for us to explain the common system, which, after all, will usually prove best and most economical. See figs. 12 and 13. Standards, SS, are bolted together in pairs, the space between them being the thickness of the in-

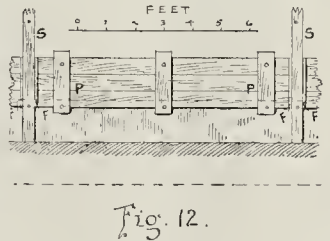


Fig. 12.

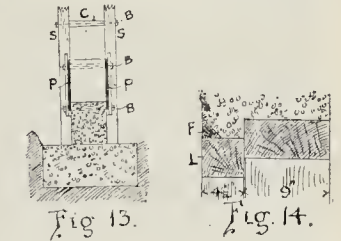


Fig. 13.

Fig. 14.

concrete-materials, may have to be brought, and upon the price of these materials; upon the cost of skilled and unskilled labour; upon the simplicity or complication of the plan of the proposed building, and the detail of its elevations; and so on. At one time, it was customary to talk volubly of the great economy of concrete over brickwork or stonework, but over and over again contractors have shown by their tenders that they thought quite otherwise. Engineers certainly find it economical to employ concrete for marine-walls, breakwaters, dock-walls, and the like, but these are vastly different from the walls of buildings; the concrete is in large masses, and requires, in comparison with its bulk, very little framework, whereas in buildings the walls are thin, and the cost of the framework (including labour in fixing and removing), especially if the plan is irregular, amounts to a considerable sum per cubic yard. Again, on the sea-beach, engineers are provided with suitable sand and gravel or shingle, for the merely nominal cost of getting it; sometimes the aggregate required in buildings must be brought from a distance, and must be broken and washed before it is fit for use. Engineers, too, make use of a concrete in the backing of retaining-walls, and in the hearts of dock-walls, &c., much inferior in quality to that which is required in the walls of buildings; in those positions, 1-to-10 and 1-to-12 mixtures are far from uncommon.

In our first chapter we pointed out that from the time of the Romans to the present day concrete-walls had been erected, and that many of these were still standing. There can be no question of the durability of good concrete-walls. At Middleham Castle masses of concrete lie amid the ruins, while one large mass remains poised on a slender pier of the same material. At Guildford Castle, which was

distanced wall. These are then set perpendicular at distances of from 6 ft. to 12 ft., according to the length of the wall. The standards at the angles of the building must be bolted together diagonally. All the pairs of standards are kept in position by means of stays nailed to stakes in the ground, or in some other manner, and also by means of pieces of wood, such as elater's laths, nailed from pair to pair, on each side of the wall. Great care should be taken that the standards are perfectly perpendicular and in line, as on them the straightness of the future wall depends.

Sometimes the standards are omitted altogether, and the walls formed by means of panels only, but this is a practice not to be commended, as it enhances the difficulty of constructing the walls quite straight and vertical.

The "shutters" or movable panels, PP, are usually made of 1 in. or 1½ in. boards nailed to ledges along the back, and smoothly planed on the face. Sometimes thin sheet-iron is nailed on the face of the boards to protect them from the wet concrete, but this is scarcely necessary, as it increases the cost without corresponding benefit, and renders the panels more difficult to shorten or alter in any way. To prevent the adhesion of the concrete, the faces of the panels are frequently covered with a coat of oil or soft soap.

The panels are, like the standards, bolted together in pairs by means of wrought-iron bolts, BB, passing through turned hardwood cores or distance-pieces, CC, which regulate the thickness of the wall; these cores are made to taper slightly, in order that they may be the more easily driven out when the concrete has set.

The width of the panels is usually such as to allow a layer 18 in. deep to be deposited at one operation.

When the standards are all in position, the panels are laid between them, and secured by means of fillets, FF, nailed to the standards. Panels should be provided sufficient to enclose the whole length of walling intended to be formed in one day, as otherwise the concrete will be strained by the removal of the panels in less than twenty-four hours. When some of the panels have been fixed in position, the concrete may be mixed, deposited within the frames to the full depth, and rammed, and so on, until the day's allotted task is complete. When the circuit of the building has been made, work is recommenced at the same pair of panels as on the first day. These are removed by withdrawing the bolts; their faces are scraped clean of all cement, &c., and the panels are refixed on a higher level, the lower row of bolts in the panels now passing through the cores of the higher row in the previous layer. As the work proceeds, other panels are taken down and refixed until the second layer is complete. No panel ought to be removed in less than twenty-four hours, for Portland cement concrete. The holes left after the cores are withdrawn must be completely filled with cement mortar (1 to 2).

The openings of windows and doors, including the necessary reveals, must be formed with rough wood-framing, which must be kept from bulging inwards by suitable struts. The temporary lints must be supported on props, the props resting on wedges by which their removal is facilitated. The head of the openings may be chamfered by means of a triangular fillet, nailed to the outer lintel, L (Fig. 14). Permanent lintels, either of wood, iron, or stone, or brick or stone arches, are unnecessary, but Mr. Potter recommends the insertion of wrought-iron bars (caulked at each end), a few inches above all openings, as these "help to prevent the unsightly cracks which sometimes occur in concrete walls."

The insertion of wood bricks or bond-timber into concrete walls cannot be recommended, as they are sure to swell with the moisture, and may afterwards become loose, or eventually rot. To prevent the ends of wood joists, purlins, blocks, &c., where such are used, from becoming loose after the concrete has dried, they are usually set with large nails, which are left projecting an inch or more, and so get a hold in the concrete. It is always better, however, to insert, instead of wood bricks, Wright's patent fixing-blocks (made from Portland cement and coke-breeze), or Thompson's "Brickwood" fixing-blocks. These hold nails as well as wood does, and are not liable to swelling or decay, or to damage by fire. Joists and purlins of wood can usually be superseded by rolled iron or steel, while for the floors of rooms up to 14 or 15 ft. square, joists may be dispensed with altogether, and solid concrete floors laid instead. Where, for the sake of economy or any other reason, ordinary joisted and hoarded floors are required, the ends of the joists can be built into earthenware or stoneware joist-hoxes, which are embedded in the concrete. Or soft bricks can be built into the concrete where required to receive the joists, and when the concrete has set and the panels have been removed, the bricks can be cut out and the joists inserted. In many cases the upper walls are thinner than those below, and the joists can rest on the ledges thus formed. When solid concrete floors are desired, they should be laid right over all walls when these are at the proper height, and not left to be added after the walls are finished.

Floors.—Flues for smoke and ventilation may be formed by wooden cores, which are made collapsible in order that they may be easily withdrawn. But it is always far better to form the smoke-flues by means of earthenware or stoneware pipes; these may be ordinary circular drain-pipes, socketed or unsocketed, or may be special flue-pipes of circular, elliptical, or oblong form, the oblong form having rounded corners. Combined smoke-and-air flues of various sections can be obtained from several makers, and these are well adapted for building into concrete chimney-breasts.

Pipes.—Pipes for water, gas, waste-water, &c., should never be built into concrete walls, on account of the difficulty of repairing them in case of leakage. Chases can easily be formed in walls where required to receive such pipes, and the front of these can be finished afterwards with wood casing.

Absorbence and Porosity.—Good concrete is much less absorbent than ordinary bricks, while in brickwork there is the further disadvantage that the joints (if of lime-mortar) are easily

penetrated by water. Bad concrete, however, cracks and admits driving rain easily. In 1873 Mr. Alexander Payne, A.R.I.B.A., read a paper on "Concrete as a Building Material" before the R.I.B.A., and Mr. Payne summed up the discussion which followed by saying, "Some five speakers have averred that concrete is wet, condenses water, shrinks, cracks, and contracts, while ten declare that it does not condense water, does not shrink, nor crack, nor take up damp." Mr. Payne wrote to a number of persons who had had a large experience in concrete building, and their testimony was to the effect (1) that concrete houses are warmer and drier than brick or stone ones, and can be sooner occupied; (2) that concrete does not condense moisture (so also do brick and stone), but that plaster rendering inside overcomes the objection; and (3) that concrete made with good air-slaked Portland cement does not shrink.*

An instance of concrete building was given by Colonel Lumsden in the same discussion. The walls of certain additions to his own house, at an old Aberdeenshire Castle, were built of concrete, 15 in. thick up to the first floor, and 12 in. above; at one corner a hauging turret about 6 ft. in diameter, was constructed with walls 9 in. thick, the supports under it being removed at the end of a week. The concrete was composed of one part Portland cement and six parts gravel, varying in size from a pea to a hen's egg, and was afterwards skimmed outside with a coat of cement-mortar, $\frac{1}{2}$ in. thick (3 cement to 5 sand).

Hollow concrete walls have frequently been built in order that the internal face of the walls may be perfectly dry, and of more uniform temperature. With good concrete in ordinary situations, and for ordinary buildings, the precaution is unnecessary, but where hollow walls are considered advisable, they may be formed by inserting in the required position between the shutters a 3-in. plank tapering slightly in thickness, from the top edge to the bottom; the taper facilitates the removal of the plank. When the plank has been withdrawn, metal ties are laid across the cavity, as in hollow brick walls, and on these ties the plank rests during the formation of the next layer.

Promotion of Impregnants.—The regulations issued by the Metropolitan Board of Works in 1886 required that 1 part of Portland cement should be used with not more than 8 parts of aggregate (containing sand). It was not stipulated that the sand should be measured separately. This precaution ought, however, to be adopted, and the concrete might be specified to be composed of 1 part Portland cement, 2 parts sand, and from 1 to 6 parts screened gravel, broken stone, or other material. The aggregate for walls should be strong, dense, and durable.

Thickness of Walls.—There is no doubt that good concrete walls are stronger than good brick walls; but such is the danger of concrete being scamped, that the regulations of the Metropolitan Board of Works (mentioned above) require the thickness of concrete walls "to be equal, at the least, to the thickness for brickwork prescribed in the Building Act."

OBITUARY.

MR. LYONS WRIGHT.—The death is announced of Mr. Lyons Wright, Consulting Engineer to the Waterworks Committee of the Wolverhampton Corporation, which took place on the 13th inst., at his residence, Worcester-street, Wolverhampton, after a long illness. Mr. Wright was a native of Hull, and was afterwards engaged at Manchester. About thirty years ago he left the latter town and came to Wolverhampton as Engineer to the Waterworks Company, and when the waterworks were transferred to the Corporation he entered their employ, and continued to hold his office for twenty-four years, until the Council meeting in June this year, when he was appointed Consulting Engineer, and Mr. E. A. B. Woodward, of St. Helens, succeeded him as Engineer of the waterworks. He was in his seventieth year.

CLERKENWELL-ROAD.—A site has been cleared between Holborn Town-hall and "The Griffin" public-house, on the south side of Clerkenwell-road, for the building, now in progress, of the offices and ball of the Workmen's Club and Institute Union, Limited. We are informed that the plans and designs are by Mr. Wm. D. Caröe.

* Apparently contraction during setting and hardening is here referred to; this must not be confounded with the contraction and expansion due to changes of temperature.

GENERAL BUILDING NEWS.

NEW TECHNICAL SCHOOL, ASTON, BIRMINGHAM.—The foundation-stone of the new Technical School for the Manor of Aston, to be erected at the junction of the Whitehead and Ettington roads, was laid on the 8th inst. by Mr. R. P. Yates, Chairman of the Technical School Committee. The new buildings will have a frontage to Whitehead-road of 98 ft., and to the Ettington-road of 99 ft. They will consist of three stories, the lower story being a semi-basement. The principal entrance will be at the corner. The middle floor will be approached directly from the entrance by a short flight of steps, 12 ft. wide, divided by a central handrail, and directly opposite at the rear will be a large staircase, leading to the floors above and below, from which the corridors to the right and left give access to all the various rooms. The accommodation of the basement or lower floor will comprise a modelling room, with recess for casting; engineering class-room, with engine-house and electric-lighting appliances adjoining; metallurgical class-room, with fire-proof bench; plumbing workshop; a laundry, having washhouse, drying-closet, and ironing-room, and there will be also a spare class-room, heating-vault, stores, &c. The middle or ground-floor will have a large lecture-room, two large rooms for elementary art, secretary's and curator's rooms, teachers' rooms, stores, and four class-rooms for sundry subjects. On the upper floor will be a chemical laboratory for 40 students, with preparation-room, balance-room, teachers' room, and stores adjoining; a large lecture-room, and also art class-rooms. On each floor ample lavatory and cloak-room accommodation will be provided. At the rear of the premises a separate storey building is to be provided for teaching carpentry and joinery work, accommodating 60 students. The buildings will be warmed by low-pressure hot-water pipes, and electric light will be provided throughout. The ventilation of the whole rooms, corridors, &c., is to be automatic. The elevations are to be faced with best pressed bricks of Stourbridge manufacture, relieved with stone and terra-cotta. The amount of the contract is £5,544. The contractor is Mr. F. A. Stephens, Aston, and the architect Mr. George H. Cox, of Birmingham.

ELECTRIC LIGHT STATION, ARUNDEL.—We understand that the tender of Messrs. Reed, Blyth, & Co., Limited, London, has been accepted for an electric light station at Arundel, for the Duke of Norfolk. Mr. A. F. Phillips, of Great George-street, Westminster, is the engineer.

ALTERATIONS TO SOUTHMINSTER PARISH CHURCH.—According to the *Essex County Chronicle*, after undergoing extensive alterations, the parish church of Southminster has just been re-opened by the Bishop of St. Alban's. The transepts have been screened off for a vestry and an organ chamber on the north side, and for a chapel for occasional use on the south side. A choir has been formed in front of the chancel, and is inclosed by a screen of oak, the choir stalls being of the same material. The chancel has been raised, two new windows have been inserted in the north and south sides of the apse, and a reredos of stone and an arcading around the sides of the chancel have been erected. The organ has been removed to the north side of the transept, occupying about one half of the space at the east end. The other works include a new altar table, a new pulpit, the re-seating of the nave with pitch-pine benches, and the provision of new oak doors at all the entrances. Two old windows were discovered in the porch, and these have been restored and filled with cathedral glass. By the removal of the gallery and the opening out of the tower arch, the echo, which formerly interfered, it is said, with the hearing, has been got rid of. Hot water apparatus has been introduced for heating purposes. The whole of the work has been done from the designs and under the personal superintendence of the vicar, the Rev. W. H. Lowder. The general work has been carried out by Mr. Tom Stammers, builder, of St. Albans; the stone work has been done by Messrs. Day & Hazelgrove, of Bishops Cleeve; the screens and chancel fittings have been made by Messrs. Luscombe, of Exeter. The whole cost of the work amounts to about 2,000l.

CATHOLIC CHURCH, MILLTOWN, COUNTY KERRY.—The Catholic Church at Milltown, near Killorglin, has, says the *Cork Examiner*, for some years been in a dangerous state, with the roof supported by props from the floor. A new church has, however, just been commenced. The church will consist of nave, transept, chancel, sun's choir, and sacristy, with bell turret and spire rising to the height of 75 ft.; it is in the style of the thirteenth century, of a simple type, with walls of rubble work, and dressings of Ballybeggan limestones from the quarries of the contractor, Mr. John B. Healy, of Tralee. The designs were prepared by Mr. Daniel O'Connell, Derrynane Abbey. The total cost of the church is expected to be about 4,000l.

PARISH INSTITUTE, WEST GREEN, TOTTEHAM.—The new Parish Institute in connexion with Christ Church, West Green, was opened by H. R. H. Princess Christian on the 7th inst. The building, which is built at the north-east

corner of the site upon which the Church stands, is of simple oblong form, and is designed by request to be somewhat in keeping with the Church. The main entrance leads into a lobby, with cloak-room, lavatory, &c. A double-glazed door divides this lobby from the large ground-floor parish-room or hall, 80 ft. by 34 ft. A raised platform with ladies' and gentlemen's dressing-rooms on either side is placed at the south-end of the hall. Two double-door sets are placed in the west, and east sides of the room, all doors being made to open outward. A door at the back of the platform gives direct communication with the caretaker's house, and also forms a convenient private entrance for performers, besides allowing for the possible use of the rooms in the caretaker's house. In the front of the platform are sliding doors, so that the space under can be used for scenery or other theatrical effects. The hall ceiling is entirely match-boarded for acoustic reasons. The brick walls are colour-washed with a warm cream colour, the red brick dressings in the jambs and arches and the stone sills to the windows being kept their natural colour. The room is lighted by eight standards, and accommodates from 500 to 900 persons. The architect is Mr. Geo. H. Fellowes Pryne, of Westminster, and the contractor Mr. Percival Hart, of West Green. Mr. S. Wood has acted as clerk of works.

PARISH CHURCH, REXTON, DUMFRIES.—The new parish church of Rexton, which has been commenced during the past fifteen months, was opened on the 18th inst. The new church is situated in Leven-street, at the south end of the village, and is of red sandstone. The design is, says the *Glasgow Herald*, seventeenth-century Gothic. The building has a nave and transepts and chancel for choir, with side aisles and chancel. There is a tower of three stages in the centre of the front gable of the nave. This tower forms the entrance wall, and provides in the upper stage the belfry, in which is placed a new peal of bells. The length of the building over all is 124 ft., the width across the transepts being 100 ft. It provides sitting accommodation for 800. The roof is of the top, the pulpit is placed at the south side of the chancel arch, and the baptismal font at the north side. The building is heated by hot-water pipes, running along the floor at each side. The architects were Messrs. H. & D. Barclay, Glasgow; the builder, Mr. James Barlas; joiner, Mr. John Gills, both of Alexandria; builder, Messrs. Boyd & Son, Paisley; and painter, Mr. W. Menzies, Bonhill.

BLACKPOOL TOWER.—Messrs. Maxwell & Take, the architects of the Blackpool Tower, report satisfactory progress with its erection. The tower is now completed up to 55 ft. high.

MODEL LODGING-HOUSE AT VAUXHALL.—On the 15th inst. a large model lodging-house, which has been erected by Lord Rowton at Bond-street, Vauxhall, for the accommodation of workmen, was opened for the inspection of visitors. The building, which has been named "Rowton-house," is situated in a somewhat narrow thoroughfare named Bond-street, near Vauxhall Cross. Having a frontage of 150 ft., the building runs back to the South-Western Railway, a depth of 105 ft., there being a paved promenade 23 ft. in width between the house and the railway. Red brick and stone are freely employed in the outer walls, while internally much use is made of glazed brick and tile. The floors throughout are of concrete, with steel joists, and the various sections of the building can be easily shut off from each other. Provision has been made for 470 beds, nearly all in separate cubicles, each provided with a window under the control of the lodger. The dormitories are arranged on four floors above the ground floor, and two officials will sleep on each floor. All the floors are heated by hot water, and there is ample provision of fire-places and hose-pipes. The sanitary appliances have been carefully planned and executed. Upon the ground-floor is the Superintendent's office and private rooms, a barber's room, dining-rooms and kitchen, a caterer's bar, lockers, and a smoking and reading room. Upon the first-floor is a reading and writing room, 70 ft. by 18 ft. The dining-rooms are fitted with ranges for men to cook their own food, while at the window opening into the caterer's room those who prefer to purchase their food already cooked can do so. The building has been erected from designs by Messrs. Beaton & Burmester.

STAINED GLASS AND DECORATION.

WINDOW, SANDY (BEDS).—A memorial window has just been fixed in the parish church in memory of Mrs. Peel, the late wife of the Speaker of the House of Commons. It consists of a four-light window with tracery above, illustrating the subject of Faith, Hope, and Charity. For the latter subject the two central lights are treated as one design, in which the central figure is that of Christ with hands outstretched to welcome those who come to him. The composition is completed by kneeling figures of a prisoner and a penitent, with the inscription extending through both lights, "Come unto me all ye that are weary and heavy-laden, and I will refresh you." The side lights, illustrating Faith and Hope, are treated independently as far as

the figures are concerned, but partially connected with the central design by the employment of canopies and vases of similar design to the centre, though in different colours. The work was designed by Mr. H. G. Murray for Messrs. Belham & Co., of London, who executed the window.

MEMORIAL WINDOW, PARISH CHURCH, ROSTREHNE, CHESHIRE.—A new memorial stained-glass window has just been fixed in the recently-restored parish church of Rostrehe, Cheshire. The window is situated on the north side of the church, and consists of ten lights filled with ten subjects, viz., examples of faith, taken from eleventh chapter of Hebrews. The work has been carried out by Messrs. Heaton, Butler, & Bayne, of London.

WINDOW, ELLAND WESLEYAN CHAPEL.—The large window facing the pulpit in the new Wesleyan Chapel, Elland, has just been filled with stained-glass to illustrate the verse in St. Mark's Gospel: "Daughter, thy faith hath made thee whole; go in peace." The window is in the Italian Renaissance style of work, and has been executed by Messrs. Powell Bros., of Leeds.

FOREIGN AND COLONIAL.

FRANCE.—The sculptor Ernest Barrias has been commissioned to execute the statue, set up by a Committee, to Anatole de Forge, a member of parliament who died. The monument is to be placed in Père-la-Chaise. The National Society of Fine Arts, presided over by M. Puvis de Chavannes, has decided that for the future there shall be a Section of Architecture at the Champ de Mars Salon. The Government has just had a number of models made of the best specimens of French architecture from the eleventh to the nineteenth centuries, for the Chicago Exhibition. This collection, which will cost about 115,000 francs, not including cost of transport, will be the property of America, and will form the nucleus of a magnificent museum of casts. It is announced that M. Larroumet, late Director of the Art and Architecture for the Government of the Gobelin's manufactory in place of M. Gerspach, who has resigned.

—M. Ernest Babelon is appointed Keeper of the Department of Medals and Antiquities at the Bibliothèque Nationale, in place of the late M. H. Lavoix. —M. Molinier is elected assistant Keeper of the Louvre Museum. —M. M. Malouin is being sent by the Government on an ethnographical mission to the districts near the Red Sea and Persian Gulf. —The architect, M. Edouard Mariette, brother of the celebrated archaeologist Mariette Bey, has just offered to the Louvre Museum a curious crayon portrait of Eugène Delacroix, executed in 1840 by Deverax.

—An inhabitant of Sautouay has just found at the bottom of a well a bronze vase, of very beautiful workmanship, with chased handles representing Roman eagles. He has also found some coins and spurs of the same pattern as now used by the Arabs, and which probably date from the time of the Saracens. These objects have been placed in the Museum at St. Germain. —The Municipal Council of Grenoble have decided to place a marble slab on the house where M. Alphonse was born. —The Municipal Council of Havre have decided that the statues of Casimir Delavigne and Bernardin de St. Pierre shall be erected on the Place Gametta. —The Société Artistique du Pôché is preparing a large exhibition of local art, which will be opened at Mans (Sarthe) on June 1, 1893. At the same time the monument erected to the memory of Germain Pilon in this town will be inaugurated. —The "Union Patriotique du Rhône" will open a competition amongst Lyons artists, which will have for its aim allegorical or symbolical works relating to scenes in the history of France. —M. Pierre Devaux, a sculptor, and MM. C. Jung, Lambert, and Louis Piot have just opened an interesting exhibition of their works in the foyer of the Théâtre Bellecour at Lyons. —The death is announced, at the age of forty, of the painter, Georges Bétégner.

He had acquired an honorable place in painting historical and war subjects. —M. Robert Rohmann, a Russian landscape painter residing in Paris, has just died in this city at the age of forty-seven. He exhibited at the Champ de Mars Salon landscapes of the environs of Paris, and views in Normandy. He received the decoration of the Legion of Honour at the Universal Exhibition of 1889, when he was made vice-president of the Russian section. —We have also to notice the death of M. George Hachette, one of the chiefs of the well-known library in the Boulevard St. Germain. —The Société Centrale des Architectes has elected its officers for 1893, as follows:—

President, M. H. Douzet; vice-presidents, MM. J. Guadet and Achille Hermant; chief secretary, M. F. Roux; assistant secretary, M. Boileau; editing secretary, M. Poupinel; archivist, M. Ch. Bartaumeux; treasurer, M. David de Penarun; censeurs, MM. Paul Scdille, Alfred Normand, and Lucien Etienne.

SWEDEN.—In the fashionable villa quarter Dyrsholm, a suburb of Stockholm, building sites to the value of 300,000 kr. have now been sold. The suburb will be connected with the city by an electric railway. —The designs for the rebuilding of the Church of Jacob in Stockholm have been

passed by the authorities, and the work will shortly be commenced. —The interior of the Catholic Church of St. Erik has now been nearly completed. The fittings, of carved woodwork, have been produced at Münster. —A new building syndicate has been formed in Stockholm, with a capital of one million kronor, with a view to erect numerous dwellings on certain lands in the southern part of the town. —Work on the new Stockholm Opera-house is progressing. The grand terrace in front will face the Square of Charles XII. on the left-hand side, and will be composed of two main stories, viz., a bottom one below the level of the site and a first floor, partly *entresol*. Above the building itself will be the open terrace, 1,100 square metres in area, and laid with cement. In the basement the steam machinery will be placed in a chamber isolated by walls, floor, and ceiling of concrete. The architect is Herr Hillerström, of Stockholm. —King Oscar has just unveiled two more frescoes on the grand staircase of the Royal Palace, painted by Prof. Julius Kronberg. They represent "Aurora" and the "Four Elements."

NORWAY.—The work on the new State theatre to be built in Christiania from the designs of Herr Bull, State architect, is progressing but slowly, owing to the scarcity of funds and indecision as to the exact plans to be adopted. The site has, however, been piled, and part of the concrete foundation laid, but the latter work must be deferred till the winter. The house is situated in the west end of the town, opposite the University, and near the Royal Palace. —The "Norwegian Labour Party" is carrying on an agitation for inducing the municipal authorities of Christiania to erect cheap and healthy dwellings for working men, of which there is great need in the capital. At present the state of things is said to be very bad; moreover, the Sanitary Board of the city does not appear to have powers to declare dwellings unfit for habitation. —Works for the supply of electricity are to be erected in the town of Malesund, on the north-west coast, the motive-power being furnished by a waterfall situated six miles from the town. —A competition for the erection of new premises for the Bank of Norway, in the City of Christiansand, has terminated in favour of Herr Berle, architect. There were sixteen competitors. —A subscription has been started for the building of an English church in Bergen, largely visited by English and American tourists. A sum of 2000, has been subscribed, and if 10,000 can be raised, the civic authorities will grant a free site.

MISCELLANEOUS.

THE CERCLE DE LUXE, PICCADILLY.—It was stated in the daily press last January that Messrs. Cochrane & Sons had bought for 80,000, the freehold of Hatchett's Hotel, with the White Horse Cellars, at the corner of Dover-street. On November 28, 1885, we published a view of the new buildings, together with a plan of the mezzanine and basement floors—as erected by Mr. John Grover, from the designs of Messrs. W. Weatherley & Jones. See also our columns of December 27, 1884, for a description of the premises, which on January 23, 1887, were sold at auction for 65,000. We now hear that the hotel has been converted for purposes of the new Restaurant Club, known as the Cercle de Luxe, its interior having been decorated and refurbished by Messrs. James Shoobred & Co.

APPOINTMENT OF BUILDING INSPECTORS.—At a meeting of the General Local Board, held on the 19th inst., the Honourable Purposes Committee reported that they had received eighty-three applications for the post of Building Inspector. There were now two vacancies to be filled, therefore they had selected ten candidates, who were invited to attend at the Board's offices on the 17th inst., and submit themselves to an examination in order to test their competency to perform the duties of the office. The examination, which lasted five and a half hours, was of a searching character. The candidates were given questions to answer in writing, and subsequently their knowledge of building materials was put to a practical test. The numbers were then reduced to five, namely, Messrs. Comber, Horton, Parham, Phillips, and Sealy. These gentlemen were further interviewed, and reduced to three, namely, Messrs. Parham, Phillips, and Sealy, and ultimately the committee decided to recommend that Mr. John Parham, at present engaged as Sanitary Inspector at Hackney, and Mr. Henry Albert Sealy, now one of the temporary Inspectors in the Board's employ, be appointed, and the recommendation was confirmed by the Board. The salaries are 1500 per annum.

REMOVAL.—Messrs. Reed, Blight, & Co., Limited, contractors, notify that they have removed their head offices from Sutton Harbour, Plymouth, to Albany-buildings, 47, Victoria-street, Westminster, S.W. The depot and works remain at Plymouth.

THE BRUGES SEA PORT PROJECT.—The *Independence Belge* states that the technical financial sub-commission appointed to examine the various projects for converting the old town of Bruges into a seaport have now terminated their labours. This scheme is part of another for the construction of a canal admitting vessels of the deepest draught from the North Sea. The commissioners have

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Table with 4 columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered. Includes 'Boasting the Working Classes'.

CONTRACTS.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Lists various construction projects like 'Road Works', 'Sewerage Works', etc.

CONTRACTS.—Continued.

Table with 4 columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered. Continues list of construction contracts.

PUBLIC APPOINTMENTS.

Table with 4 columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in. Lists various public roles like 'Mining Surveyor', 'Clerk of Works', etc.

Those marked with an Asterisk (*) are advertised in this Number. Competition, p. iv. Contracts, pp. iv., vi., & viii. Public Appointments, p. xviii. & xix.

decided in favour of the plans prepared by Messrs. Coiseau & Cousin, which would make Bruges the terminal port of the canal, somewhat similar to the position of Manchester on its ship canal.

THE PROJECTED EXHIBITION IN ROME.—The project of holding an international exhibition in Rome in 1895, on the occasion of the celebration of the twenty-fifth anniversary of the city becoming the capital of Italy, has advanced another step by the election of Prince Ruspoli as syndic, who is an ardent advocate of the scheme.

RAILWAY MANUFACTURING WORK.—A long and very fully illustrated article on the Great Northern Railway Works at Doncaster appears in the Engineer of December 18. Those who wish to learn something of the processes of manufacture in a great railway workshop will find an unusual amount of information compressed into this article, which is, of course, of a very different calibre from the merely popular articles on railway work which have appeared in various magazines lately.

THE HIGHGATE MUSEUM OF SANITARY APPLIANCES.—We are asked to say that this museum, established by the Hornsey Local Board, is open free to the public daily from 10.30 a.m. to 8.30 p.m.

ROYAL STATISTICAL SOCIETY.—At a meeting of the Royal Statistical Society, held on Tuesday last, at the Museum of Practical Geology, the President, Mr. Charles Booth, in the chair, a paper was read by Mr. J. A. Baines (Census Commissioner for India) on the "Distribution and Movement of Population in India." As to the density of the population, the mean of which is 184 to the square mile, the provinces, which comprise 77 per cent. of the total number, show 230, and the states, 111. In Europe there is a population of about 384 millions, of a density ranging from 500 to 300 to the mile, whilst in India over 46 millions live, in the proportion of 600 and over, and more than 36 millions show one and a half to the acre. But the density has to be considered with reference to the capabilities of the soil and the nature of the tract, and the above-mentioned remarkable congregation of people, owing to the great fertility of their tract and the variety of occupation to be obtained in it, are probably in better case than other tracts named, where the density is only 120 or 240. As regards the population, India presents a marked contrast to the western continents. Even including the smaller towns that have been given this status for municipal objects, only 10 per

cent. of the population is classed as urban. In England 53 per cent. lives in places of 20,000 inhabitants or over; in India, only 4½ per cent. The next subject taken up was the variation of the population since the last census. This amounts to 31 per cent. in the British provinces, and 15½ in Native States. In British provinces, the area supporting a population of less than the mean of 230 per mile, increased by over 13½ per cent., but the rest, by 10 per cent. Only. Even in the most densely populated tracts, such as those mentioned above, the rate of increase was nearly 3 per cent.

THE EXHIBITIONS IN BRUSSELS AND ANTWERP.—The plans for the double exhibition to be held next year in Brussels and Antwerp have now been approved by the Belgian Government, and may be considered assured. The necessary funds, too, have been secured through an arrangement between the Exhibition Committee and a banking syndicate. The Crédit Général de Belgique advances a sum of 1,500,000 l. upon the security of the takings for admission. There is besides subscribed a guarantee fund, amounting to 800,000 l., of which sum 250,000 l. are subscribed by the city of Brussels. A. M. Picard, an economist, proposes the formation of a special section, showing the unwholesomeness of workmen's dwellings in general and the dangers of certain classes of factories, works, and workshops.

WINDOW GLASS.—We have had brought under our notice some samples of the glass supplied by the Felgian Company known as the Red or Glass Works. The glass is very clear and even in tint and texture, and appears altogether to be of excellent make. We are informed that the output of the company exceeds 12,000,000 square feet per annum, and new buildings are now in course of erection which will allow of the production being furthered. These tank-furnaces measure 65 ft. by 17 ft. by 4 ft. deep, and contain a constant supply of 300 tons of molten glass, continuously drawn on, night and day, by a staff of 120 blowers.

THE FORTHCOMING EXHIBITIONS IN ANTWERP AND BRUSSELS.—The Belgian authorities have granted the use of the former exhibition buildings for the holding of the projected Exhibitions next year in Antwerp and Brussels, to which we recently referred. The Crédit Général and the Socié Générale have each granted 500,000 l. towards the guarantee fund, and the two cities a sum of 250,000 f. each. In the Brussels Exhibition will be represented the fine arts, historical art, salvage, and hygiene, out in Antwerp only commerce and industry.

THE ENGLISH IRON TRADE.—With the near approach of the Christmas holidays little attention

can be expected in the iron trade. Prices generally are unchanged. In crude iron little is doing, although a slight increase of activity is reported in the Cleveland pig-iron branch. Finished iron is very quiet, and tin-plates continue in a dull condition. Steel shows little change in most departments, inactivity being the rule. Ship-builders are a trifle busier; but engineers are poorly employed. The coal trade is moderate.—Iron.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

268.—BRICKS.—T. Sterratt, jun.—This invention relates primarily to outside or facing bricks, and is designed to provide a brick well-locked in position in the wall, and which will render the wall impervious to moisture. It consists of a brick formed with a V tongue on one side and end, or on two sides, and a corresponding V groove on the opposite side and end, or two opposite sides. 269.—WATERSPOUTS: W B Shorland.—This invention applies to the wire guards used for protecting the upper ends of waterspout nozzles, and the like, from the entrance of rubbish likely to choke them. It consists to improvements in their construction, tending to lessen their cost. The wires are placed, when cut and shaped, into suitable holders, and united together at the points of juncture by means of hoses, or rings, of easily flaxed metal, or other suitable material, which is run into the holders in a molten, fluid, or soft condition, soldering them firmly together when hardened; or the wires or other fittings may be formed in two pieces and riveted, screwed, finished, or otherwise fastened together. 27,548.—WOODEN FLOORINGS: F Theising.—This specification refers to an invention intended to obviate the drawbacks of the ordinary wooden floorings in new buildings, which are liable to rapid decay owing to the dampness of the building, and this particularly in the case of hard woods. Hard woods are for this reason first to be squared in a bed of asphalt placed upon cement. The deleterious action of the moisture has not, however, been avoided, as, owing to the damp penetrating, the flooring boards expand, and are thus liable to warp, and to spring up. Wooden floorings are by this invention so constructed that they cannot as such expand, but, on the contrary, the expansion of the several parts of which the flooring is composed is restrained in the flooring itself. The flooring consists of two layers of boards of hard wood, placed diagonally one above the other, which are combined into one by means of a composition, preferably asphalt, serving as connecting material in such a way that the mixture fills up the joints occurring between the two sets of boards where the individual boards meet one another. The lower surfaces, which are to be set in the mortar, as well as the top side surfaces, are covered with a water-tight coating, so that damp can only penetrate and again evaporate from above. Projections are provided on the lower side of the flooring boards, which give them a suitable hold in the mortar. Any sideways displacement of the boards, among each other is prevented by the lower boards being connected with the upper ones by means of nails.

LONDON.—For providing and fixing heating apparatus on the low-pressure steam system, with the necessary boilers for the new school in care of erection on the High Wycombe site, Clarendon Hill, for the School Board for London. Mr. T. J. Bailey, Architect:—
 Purcell & Nohs £260 0 0 Davis £296 0 0
 W. G. Cannon 149 0 0 J. Condy, Hancoc-street, E.C. 5
 J. & P. May 510 0 0 City-road, N.E. 85 0 0
 * Recommended for acceptance by the Works Committee.

LONDON.—For enlarging the Battersea Park-road school by 157 places; for erecting a laundry centre, and for carrying out other works for the School Board for London. Mr. T. J. Bailey, Architect:—
 Add if brickwork built in cement:
 Kirk & Randall £13,340 0 0
 Hart Bros. 13,140 0 0
 Holliday & Greenwood 12,875 0 0
 S. & W. Pittinham 12,570 0 0
 E. Lawrence & Sons 12,245 0 0
 J. Mars and 11,980 0 0
 Foster & Dickson 11,890 0 0
 James Lonsley & Co. 11,791 0 0
 D. Charteris 11,467 0 0
 W. Downes 11,310 0 0
 J. & M. Patrick, Rochester 10,790 0 0
 * Recommended by the Works Committee for acceptance.

LONDON.—For the enlargement of the Blackstock-road School, Highbury, by 283 places, and for the enlargement of the Infants' School for the School Board for London. Mr. T. J. Bailey, Architect:—
 Add if brickwork built in cement:
 G. S. & Williams & Sons £7,965 0 0
 Kirk & Randall 7,748 0 0
 E. Lawrence & Sons 7,699 0 0
 W. M. Dabbs 7,575 0 0
 J. Grover & Son 7,460 0 0
 Charles Cox 7,290 0 0
 D. Charteris, Page-street, Westminster 7,275 0 0
 * Recommended by the Works Committee for acceptance.

LONDON.—For enclosure, draining, levelling, &c., land in connection with the Laxton-road School, Brompton; for erecting new water-closets for all the departments of the school, and for other works for the School Board for London. Mr. T. J. Bailey, Architect:—
 Holliday & Greenwood £2,358 0 0
 H. Mallett 2,110 0 0
 D. Charteris 1,960 0 0
 * Recommended by the Works Committee for acceptance.

LONDON.—For disconnecting and ventilating the drains, &c., in connection with the Fernside-road School, Hamstead, for the School Board for London. Mr. T. J. Bailey, Architect:—
 John Moxon & Co. £250 0 0
 B. P. Kent 310 0 0
 Foster & Axtell 280 0 0
 G. Lyford 170 0 0
 * Accepted by the Works Committee.

LONDON.—For fitting up a room in the boys' department of the Whitbread School, Dalston, as a chemical laboratory, for the School Board for London. Mr. T. J. Bailey, Architect:—
 E. Lawrence & Sons £250 0 0
 Norris & Luke 202 0 0
 * Accepted by the Works Committee.

LONDON.—For draining, levelling, &c., land in connection with the Penrose-street School, Waltham, and for providing covered playground for the girls' and infants' departments, for the School Board for London. Mr. T. J. Bailey, Architect:—
 Smith & Son £608 0 0
 J. Every 470 0 0
 W. Howarth 408 0 0
 * Recommended by the Works Committee for acceptance.

LONDON.—Accepted for tax-paving and other works to three existing courts at the Eastern Hospital, the Grove Hospital, for the Metropolitan Asylums Board. Messrs. A. & C. Hanson, Architects, 15, Leadenhall-street, E.C. 3:—
 A. C. W. Hobman & Co., South Berners-street £149 10 0

LONDON.—For rebuilding rear portions of Nos. 43 and 45, D'Aguiar-road, South Bermondsey, for Mrs. J. R. Matthews:—
 H. Brown £370 0 0
 Green & Smith 375 0 0
 John Groves 350 0 0
 * Accepted.

NEWPORT (Mon.).—For alterations and additions to bakery, Caerleon-road, Newport, for Mr. G. Collier. Mr. W. H. Watling, architect, Council Chambers, Newport:—
 W. M. Fitzhugh £170 0 0
 E. Richards 159 0 0
 * Newport accepted. £175 10 0

NEWPORT (Mon.).—For alterations and additions to house No. 23, Hill-street, Newport, for Mr. A. Rice. Mr. W. H. Watling, architect, Council Chambers, Newport:—
 J. Browncombe £194 0 0
 C. Lark 180 0 0
 W. J. Clark 155 0 0
 * Newport accepted. £144

NEWPORT (Mon.).—Accepted for the erection of shop and dwelling houses, No. 23, Commercial-street, Newport, for Mr. G. Pells. Mr. W. H. Watling, architect, Council Chambers, Newport, quantities by the architect:—
 Wm. Matthews £750 0 0

NEWPORT (Mon.).—For the erection of fifty terrace houses on Penryn Estate, Newport Mon., for the Newport Land and Building Corporation, Limited. Mr. W. L. Griffiths, architect, Newport, Mon.:—
 Hy. Welsh £24,000 0 0
 Limited 23,420 0 0
 John Jenkins 22,800 0 0
 * Accepted.

NORTH HAMPTON.—For alterations to premises, Guild-street, for Messrs. Johnson & Wright. Mr. Edmund Law, architect, Abingdon-chambers, Northampton. Quantities by the architect:—
 F. F. Morgan £2,200 0 0
 Woodford & Son 2,228 0 0
 G. J. Fildes 2,210 0 0
 Robert Ford 2,174 0 0
 A. P. Havin 2,044 0 0
 J. T. Wigmore 1,959 0 0
 * Accepted.
 [All of Northampton]

NOTTINGHAM.—For works at the Bath-treat Reversion Ground (the contract). Mr. Arthur B. Peckham, Civil Surveyor, Guildhall, Nottingham:—
 Contract No. 1.—Stonecut:
 Bell & Sons £110 0 0
 H. Green 232 0 0
 Hudson & Son 219 0 0
 Contract No. 2.—Ironwork:
 Miller & Sons £284 19 6
 New & Co. 659 17 0
 W. H. Vickers 158 0 0
 H. Cahell 573 19 0
 Goddard, Massey, & Waterer 568 0 0
 Cowen & Co. 545 6 0
 T. Banks & Co. 315 0 0
 Souds 300 0 0
 Contract No. 3.—Fencing:
 Toop £1,608 0 0
 [Both of Nottingham.]

ORFINGTON (Kent).—For additions and alterations to Children's School, for the Brighton School Board. Mr. George St. Pierre Harris, architect, 1, Basinghall-street, E.C. Quantities by Messrs. C. Atanger & Sons, surveyors, 21, Finsbury-pavement, E.C. 2:—
 Osborne & Co. £2,317 9 2
 R. Lowe 2,244 15 0
 W. Gribb 2,284 16 0
 London & Son 2,234 9 0
 Dutton 2,223 0 0
 * Accepted subject to the approval of the Education Department.

REDRUTH.—Accepted for the erection of a dwelling-house, shop, tobacconist, and stores, at Forest-croft, Redruth, for Mr. W. S. Hill. Mr. Sampson Hill, architect, Redruth:—
 Carpenter and Joiner—W. C. Hodge £319 0 0
 * Accepted.

REDRUTH.—Accepted for rebuilding dwelling and shop, Bond-street, Redruth, for Mrs. Tegg. Mr. Sampson Hill, architect, Redruth:—
 James Goldsworthy and Edward Satter £471 0 0

REDRUTH.—For the erection of grand stand, for the Leathre Recreation Ground, Company. Mr. Sampson Hill, architect, Redruth:—
 W. C. Hodge £137 0 0
 W. C. Hodge 137 0 0
 T. H. France & Co. £125 10 0
 E. Sutter (accepted) 118 0 0

TORQUAY.—For the construction of a concrete sea-wall, &c., Torbay-road, for the Town Council. Mr. H. A. Garrett, Borough Engineer, Town-hall, Torquay:—
 Lo & Co. £2,920 12 0
 G. & H. G. S. 2,710 0 0
 John Shillcock 1,475 0 0
 Cushman & Sons 1,850 0 0
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 FACTORIES: CLEVELAND WORKS, W.

The Builder.

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Essays on Classic Architecture.



HIE friends of the late M. Adrien Joigny have collected in one volume, under the title "Histoire des Ordres dans l'Architecture," the articles on various details of

Classic architecture which he had written for the Encyclopædia of Architecture now in course of publication under the editorship of M. Planat, for which he had undertaken to treat the subjects coming under this class. The idea of thus combining his articles in a separate publication, as a kind of memorial to their author, is natural and praiseworthy, but it must be admitted that the scope and character of the volume thus formed would have been better expressed under the title which we have put at the head of this article than by that which has been appended to the volume. A collection of articles originally written to take their separate places in the alphabetically arranged order of an encyclopædia must necessarily have a somewhat disjointed effect when put together to form a separate hook; and to say that "the subject is thus treated in its entirety and the work is complete" is saying more than the form of the hook warrants. The articles on "base" and "chapiteau," for instance, are not confined to Classic architecture, but run on into the variations of these features in the Mediæval period, as according to the plan of an encyclopædia must necessarily have been the case; and in the whole hook there is a want of that continuity of plan which is essential to a complete work on such a subject. The editors have done what they could to minimise this unavoidable defect by a certain classification of the articles. They have preserved the alphabetical arrangement which the first destination of the articles rendered imperative, but they have subdivided them into three classes, the first including the essays on the general spirit of antique archi-

ture, under such headings as "L'Architecture Egyptienne," "L'Architecture Grecque," &c.; the second set of essays relating to the distinction between the different orders; the third, to the more technical consideration of details, such as "architrave," "astragale," "attique," &c. This was all that could be done, under the circumstances, towards making a complete hook out of these fragments, and if the result is not quite a complete and logically developed treatise, the hook certainly contains a great amount of information, suggestion, and illustration in regard to Classic architecture, and in this respect is a suitable though imperfect literary memorial of an earnest and painstaking student of ancient architecture.

The preface gives a slight sketch of Joigny's artistic life and studies. He had been in early youth attracted by the subject of the origin of Greek art, and in 1881 presented to the "Académie des Inscriptions et Belles-Lettres" a study on "the origin of the Greek orders," which gained him a place among the candidates for the Fould prize. He had already visited Italy and made careful studies at Rome, Pompeii, and Paestum, and in 1881 he visited Greece, and there corrected, from the study of the actual monuments, some of his former ideas, and returned fortified with fresh knowledge of the subject. He was thus marked out by his chosen line of studies for the part which he was invited to take in the Encyclopædia of Architecture, and it is recorded of him that he was never content with second-hand information, but relied always on observations made on the spot by himself. If this were so, it was the more creditable to him, inasmuch as this necessity for personal study of monuments is by no means admitted in practice by all the archaeologists of his country, however it may be commended in theory; and in fact we are now witnessing the production (and the translation into English) of a whole series of works on the history of ancient architecture, by two French writers who hardly even make the claim to have studied ancient remains at first hand.

There is not, perhaps, much information to be found in this volume which is not to be extracted from other existing works on Greek

architecture; but it has the advantage of collecting in one volume information which is in general only to be got from several different works, and it has the further value arising from original and thoughtful critical observation. The first article in the series of general articles, a short one on "Athens," we may pass over; that on Egyptian architecture which follows it (we have here an example of the logical weakness of reproducing articles in their alphabetical order, for certainly Egypt ought to come before Athens in any historical survey) is not new in its facts, but we come upon some excellent bits of original criticism. One of these is the remark in regard to the ahaeus, that with the Greeks this was a portion of the column, with the Egyptians it was a portion of the architrave, worked solid on it, the intermediate portion being partly cut away to define the ahaeus and (perhaps) to give emphasis to its junction with the column. Hence, as Joigny points out, even where the ahaeus was not an actual portion of the architrave, it was nevertheless designed with reference to the architrave and not with reference to the column; it was not, as in Greek architecture, a feature crowning the column and spreading out beyond it, but a block interposed between the column and the architrave, and cut to the width of the latter, and not with reference to the scale or design of the former, and not forming, as in the Doric column, a portion of the block out of which the capital was shaped. Another remark worth noting is in regard to the destroyed Temple of Elephantine, which has been often cited as the original of the Greek peripteral temple, that in the "colonnade" on the flanks the piers do not take the form of columns, although this form is given to the two central piers of the front, facing the entrance; they are only blocks of wall with open spaces between them. We confess that we are still disposed to think with Fergusson that such a structure as this was the parent of the Greek peripteral temple; but the point was worth drawing attention to, that the real column of the Egyptians, when used in long ranges, was always internal and not external; that when what was in fact an external colonnade was

* Histoire des Ordres dans l'Architecture. Par Adrien Joigny. (Paris: Dunjardin et Cie, 1892)

made use of, the column form and design were not carried out in detail; that in short, the colonnade with the Egyptians was essentially an internal feature, with the Greeks essentially an external one.

In the chapter on Greek architecture there are some special theories advanced which seem rather like yielding to the temptation (so often a fatal one with French and German archaeologists alike) to have a view of one's own, than like sober conviction founded on fact. Such, for example, is that rather sensational distinction suggested between the fluting on the Doric and Ionic columns. The Ionic is said to be fluted by means of grooves cut in the surface of the column, so that the true diameter of the column is that taken round the fillets between the flutes; while it is argued that in the Doric column the flutes are to be regarded rather as formed by edges projected beyond the normal surface of the column. The reason given for this strange and fantastic suggestion is the evidence (cited but not supported by any illustration) of the ancient Temple of Artemis near Syracuse, in which the edges of the flutes turn inwards at the necking, which is flush with the central surface of the flutes. But this is only taking an obviously abnormal example as if it were the rule, and ignoring all the well-known and much finer examples in which the flutes are obviously regarded and designed as sinkings in the surface of the true column. Even if the Artemis capital alluded to be admitted to be older than many of the examples of such fluting, this merely proves that the later Greeks had the good sense and artistic perception to do away with an absurd and ugly treatment, and to design the column on truer æsthetic lines. We must surely, in inquiring as to æsthetic basis of design, go by the most numerous and most beautiful examples, and not found our theory on an ugly anomaly.

Joigny was not one of those who believed in the hypæthral temple. He refers to the idea, based on a passage in Vitruvius, that in the temples with interior colonnades only the aisles were roofed and the centre portion left open, which is the most reasonable idea of a hypæthral temple (a little like the atrium of the Roman house on a great scale), and remarks thereupon that in the temple at Paestum, of which the interior colonnade is more complete than usual, the colonnade shows a simple parallelism with the side walls, and no sign of a return of the architrave and order parallel with the end walls, which would be an architectural necessity for a hypæthral temple on the idea of roofed aisles and an open centre. In regard to the passages in Vitruvius which are supposed to support the hypæthral idea, Joigny asks if they have not been interpreted to mean too much. He illustrates his argument by the remark that a writer in describing the Pantheon might quite truly say that it was open to the sky, or lighted from the sky, yet it is not a hypæthral temple in the sense of the older archaeologists. Joigny frankly robs his restored Paestum temple entirely with timber, merely observing that he has no doubt that the architects, for reasons of monumental construction and expression, would have roofed it with stone if they had known how; and he suggests that it was probably sufficiently lighted from the door.

In this view Joigny anticipated Dr. Dörpfeld's more recent critique. On the other hand he displays in some other points that curious ignorance of or indifference to the discoveries or suggestions of foreign, and especially of English archaeologists, which is so specially characteristic of French architects. Not the slightest reference is made, for instance, to Fergusson's theory of the lighting of the temples, which is for him non-existent. Reference is made two or three times to the much-discussed passage in Vitruvius, in regard to the decastyle character of hypæthral temples, and to the temple of Jupiter Olympius in particular; but there is no reference to the fact of Mr. Penrose's discovery that the temple was octastyle. If Joigny, who died at the end of 1891, was not

aware of this, at least his editors might have known it and made some reference to it. Most extraordinary of all, in the remarks on Greek Doric architecture no reference is made to the optical curves of the Parthenon, nor to the name of Mr. Penrose, of whose work Joigny seems to have been entirely ignorant, and is therefore silent in regard to one of the most remarkable points in Greek architectural design. In fact, the Parthenon is nearly left out of his description of Greek monuments, and only incidentally alluded to in passing.

In regard to the metopes, Joigny takes the view that, before the Doric temple had attained its peripteral development, the metopes, which he regards simply as spaces—"le mot *metope* veut dire d'ailleurs *bauchetrou*," were in reality spaces for admitting light or air, occurring in the non-peripteral temple at the same point where the frieze occurs on the *cella* of the Parthenon; and that when the peripteral temple was developed and the features of triglyphs and metopes took their place in the outer wall over the columns, there was no more reason for the metopes remaining open, as they would no longer open into the temple; and that accordingly, while the idea of an interspace between piers was retained, the now useless space was filled up with a carved slab.

The chapter on "Architrave" is a very interesting one, and contains some curious details as to the employment of iron ties and anchors in what must be called the sham architraves of the Louvre and the Panthéon. A sketch is given of the construction of this portion of the Panthéon, showing the concealed relieving arches, of flat segmental lines, carried over the spaces between the columns to relieve the built-up architrave, with its iron bandages, from the weight which it is supposed to carry. It might be thought there was hardly a more pronounced form of sham construction to be met with than this; but as it was the work of a French architect, Joigny takes an opposite view of the matter.

"We are far enough here from the Pantheon. What efforts, what precautions, to arrive at reproducing without danger the simple aspect of that ancient system of construction! Rightly considered, however, one finds something touching in this elaborate endeavour, for it tears witness to the ardent love, on the part of those who practised it, for the noble forms of antique architecture, and their sincere homage to the great traditions of the art" (!)

This is certainly the most singular way that could be imagined of showing respect for the "great traditions" of the art of architecture.

The short chapter on the "Attic" contains some good remarks, especially in the definition of the attic as "a story superposed on an edifice of which the *ordonnance*" (a word for which we have no precise equivalent in English) "is already complete." This is a very good expression of the philosophy of the attic, and serves as a good basis for the criticism of such a feature. Joigny remarks that no definite proportions have been established for the attic, for the precise reason that it does not enter into the composition of the order, but is "de superfluitation," that accordingly taste and feeling are the only guides in its composition, "et ce n'est pas un médiocre succès que d'y réussir." Joigny gives an illustration of what he calls the "false attic" employed by M. Nenot in the new Sorbonne, in which the cornice of the attic is the main cornice of the building, and therefore dominates the cornice of the order, to which however a certain individual significance is imparted by carrying it round some projections independently of the main cornice over the attic. The wall of the attic is also here connected with the order (as is often done) by the statues which stand over each column but with their backs against the attic. But though the "false attic" may be false according to scholastic rules, it affords a great deal of scope for variety and powerful effect in the treatment of a façade. The defence of the "true" attic depends of course, in reality, on the internal arrangement of the building. Where there is an upper story used for inferior purposes, above the more important stories of

the building, the attic is a true expression of the architectural idea; otherwise, it is as "false" a feature as can be.

In the chapter on the "Base," which, as we have already observed, goes beyond the professed subject of the volume, the author brings out well, by a number of profiles of bases of different ages, the far extended effect which the attic base had upon this feature in all succeeding European architecture; and he also does for the Gothic base what some English writers have done for the Gothic arch-mould; viz.: shows by a series of profiles its gradual development from a series of squared sections arranged step-fashion. A curious example is given, in a Gothic base from the Church of Notre Dame at Semur-en-Auxois, of the exaggeration of that peculiarity not infrequently found, in a lesser degree, in Gothic bases, of the moulding which is the survival of the antique torus over-sailing the surface of the square die on which it rests. In this case the wide and rather flat-shaped torus moulding over-rides by nearly half its width, standing out into the air on each face of the base.

The chapter on the capital is one of the longest and fullest, and one of the best essays on that charming and fertile subject which has been written. We can only refer to one or two points in it. In regard to the Corinthian capital, Joigny regarded it as derived from Egypt, not directly, but by some intermediary steps which we have lost. Some very Corinthian-looking capitals which have been found in Egypt, and were formerly supposed to be clear proofs of the Egyptian derivation of this capital, are now known to belong to the time of Roman occupation, and were probably merely attempts to re-create the Corinthian capital in a different and more stubborn material. The author gives, however, an illustration from a Roman medal which he at least takes to be a representation of the Temple of Paphos; he does not give either the provenance of the medal or the reason for supposing it to represent that particular temple; French writers always expect one to take these things for granted; but the design is certainly curious and significant. It represents a façade with capitals of a double order of leafage, roughly indicated, but projecting like the leaves of a Corinthian capital, certainly unlike anything Egyptian, over which is an architrave of the Egyptian type, cut away upwards between the columns, and leaving a square die or abacus forming part of the architrave. The composite capital Joigny regards as arising from a feeling that the usual type of Corinthian capital was too light for its work, in a large building, and as being an endeavour to produce, on somewhat similar lines, a capital of heavier proportions and expression. Of the ideas suggested as to the origin of the Doric capital, which could not be appreciated apart from one or two illustrations that are given, we can only say that, while pretty, they appear to us as fanciful and as devoid of historical value as the derivation of the Corinthian capital by Vitruvius from a basket of leaves with a tile on the top, so long an article of faith in popular text books. This article and that on "column" are however well worth reading, that on "cornice" is a good one, but somewhat partial and random in its treatment of the subject, as also those on "entablature" and "frieze."

Though, however, the book cannot be said to be the complete treatment of classic architecture which it is claimed to be in the preface, it is undoubtedly a very interesting volume, and one containing a great deal of thought and suggestion, accompanied by a large number of useful illustrations, and bears testimony to the ability and industry of the deceased architect whose name and studies it is intended to commemorate.

CHANGE OF NAME.—We notice that the well-known firm of "Measures Bros. & Co.," engineers and contractors for structural ironwork, has been registered as a limited liability company under the style of "Measures Bros., Limited."

STRUCTURE AND PROPERTIES OF OAK.

WE now, as promised last week, conclude our remarks on this subject:—

Oak Converted into Boards.—In selecting wood that has been converted into boards, quite as much practical skill is required as when it is in the log form; but boards which are taken from oak logs that have been quartered are much more easily dealt with than if they had been taken from logs that had not been treated in this way, and especially is this the case with oak, as those boards that give the best development of the ray or silver grain on their surface can be very easily separated from boards that merely present a plain straight grain. A special advantage in boards that are taken from a log that has first been quartered, compared to boards that are taken out of the full width of a log, is that they are not liable to warp or split, as the rays pass through them from one side to the other, and act across the grain as a binder, and shrinkage in them is two-thirds less than it is in boards that are the complete width of the log, except a few boards on either side of the centre, in which the concentric rings are at a right angle to their surface, consequently on the quarter. Boards 2 in. thick and under 2 in. in thickness taken out of the entire width of an oak log, should not, under any circumstances, be relied upon to remain for any length of time in a sound state, however perfect they may appear when cut out of the log, as in 5 in. or 6 in. in the centre of each board the ray will pass through them at a right angle to their surface, and as the ray is composed of cell tissue, it is wanting in the properties of adhesion, and readily breaks away, even during the process of seasoning. This is common knowledge to those who have had but a short experience with oak that had been cut in the ordinary way, with the boards the full width of the log. It has been supposed by some persons that the quartered oak imported from Russia, Prussia, and Austria is quartered for the purpose of making it convenient for transit from the forest to the port of shipment. But by cutting oak logs in this way, in addition to the logs being made easy to handle, and the cost of transit reduced to a minimum, the expense incurred in quartering is compensated in the immediate sale which good and serviceable wood invariably commands; the logs being cut in the only way which prepares them for being profitably converted into planks or boards such as manufacturers may rely upon, when they are thoroughly seasoned, as being safe from warping in any position that they may be placed in.

Seasoning Oak.—Thorough dryness in wood, that is to be used for manufacturing purposes, is absolutely necessary, and to ascertain the state it may be in in this respect the keenest scrutiny is required. Seasoning does not follow on a given time, as the thickness of the planks or boards may vary from 4 in. to $\frac{3}{4}$ in. in thickness, and the time for seasoning a $\frac{3}{4}$ in. board can hardly be compared with the time necessary for seasoning a plank 4 in. thick. The primary conditions in seasoning oak will be found in the position in which it is placed during the process of drying. Many persons, to economise space, place the planks or boards horizontally, and pile them above each other with a space between the boards sufficient to admit of a free current of air to pass through. The object of piling in some cases is to prevent the boards from warping, but this system is not required for such a purpose if the logs from which the boards were taken had been carefully assorted previous to being converted. To season oak boards in piles results in giving a dark and light side to each board, in addition to one side being harder than the other, and the seasoning a good deal delayed compared to the time required for drying if the boards or planks

were placed upright, and had been, immediately after being cut, fully exposed to the weather for several days, and washed down with water to remove the mucilage exuded from the pores when the wood is fresh cut, which, if allowed to remain, readily ferments and sets up mould that tend to discolour the wood, and not unfrequently leads to subsequent decay. When boards are first treated in this manner, and afterwards placed in an upright position in racks, under cover of a shed where a slight current of air passes along the ground, and light all hut excluded, the best seasoned timber is obtained, and when brought into use in manufacture this will be apparent in the light tone of colour in the wood, and an even temper in it throughout, whereas in those boards that are piled in a horizontal position, and situated in a way that exposes them to strong currents of air, the conditions of the wood are materially altered. In such cases, the pores become receptacles for dust, which rapidly accumulates, and in a very short time fills them, and combines with the mucilage and the atmospheric moisture that invariably lodge on the surface of each board. This mixture of mucilage, dust, and water penetrates the wood to such an extent that in some instances it will be necessary to take off from the surface of the boards one-sixteenth of an inch more than that which would be required to procure a finished surface if the boards had been placed in a vertical position during the process of seasoning.

It would be a difficult matter to point out any special feature in the appearance of oak in planks or boards that would give reliable indication of the wood being thoroughly seasoned. The usual mode of proving dryness in a plank or board is to cross-cut it at a convenient length, and plane the ends that have been cut perfectly smooth, and if the moisture has not entirely evaporated it will be here indicated in the centre of the thickness of the board as a thin streak or small spots slightly darker in colour than that which the moisture has passed from. This test may be quite safe under the direction of an expert, but in some cases the shades blend so delicately that none but the thoroughly practised eye will detect that moisture is present in the wood; and in the event of the boards being required in their full length, the cross-cut test cannot be made. Therefore, the manufacturer can only by reason of lengthened experience and close observation infer from the general appearance and weight of the wood, the state in which it is. Yet this gives no data for the uninitiated or beginner to go by, as the amount of moisture given off in seasoning by each class of oak differs considerably, and the apparent state of the surface of the wood will be greatly influenced by the situation it may have been placed in to season, and the weight will depend on the state of the texture of the wood, whether it be of a compact or open nature. Thus it is important in trying to ascertain the condition of the wood, that some easy and safe method should be taken that would be available for those who have not had the benefit of dealing with timber for any length of time. This will probably be best found by ascertaining the difference in weight between fresh cut wood of the same texture and that which is known to be thoroughly seasoned. Wood that is of a soft porous nature contains more moisture than that in which the pores are small and the lignine closely united, so that in making a test by weight these features must be carefully noted.

To take the five oaks in order, the best British oak will be found to contain the greatest quantity of solid wood or lignine in proportion to pores and cell tissue, so that in it the difference in weight from a green to a seasoned state does not exceed 25 per cent., or, to put it in another form, a superficial foot 1 in. thick in a green or fresh state will weigh about 100 ozs., and when thoroughly seasoned the weight will be about 79 ozs.; and a good medium quality when thoroughly seasoned will give 72 ozs. to the superficial foot 1 in. thick. British oak that only weighs about

66 ozs. to the superficial foot 1 in. thick when seasoned may be considered inferior and not suitable for purposes that require the higher grades of strength, though for structures where a high degree of strength is not specially required, it will be found to be a serviceable wood. Russian oak, known as Riga oak, of a good quality, will give when thoroughly seasoned 70 ozs. to the superficial foot, and the difference in weight when fresh cut will be about 30 per cent., or 91 ozs. to the foot. Dantzic or Prussian oak gives 70 to 72 ozs. to the foot, and about the same difference in weight when fresh cut as Russian oak. Stettin shipments, as already stated, are often inferior to the oak imported directly from Dantzic, being more open in the grain and lighter in weight when seasoned. A good quality will give 60 ozs. to the foot, and in a fresh state it will give a difference of 81 ozs. to the foot superficial (at 1 in. thick). Austrian oak, which is rougher in the grain, and the pores larger, shows a greater difference in the weight found at the two extremes states. When fresh cut it will be about 86 ozs. to the foot superficial of inch stuff, and when perfectly dry about 62 ozs. American white oak, of a good quality, will give 72 ozs. to the superficial foot, with a difference of weight in a green state of 37 ozs. to the foot. The widest range is found in the oak known as Baltimore and Quebec oak, which give, in a moist state, or fresh cut, 86 ozs. to the foot, and, when thoroughly seasoned, 60 ozs. to the foot superficial, 1 in. thick. In this oak the fibres are rough, and the lignine is of an open porous nature compared to the others, which account for the excessive difference in weight that is found in it from a green to a seasoned state. But whatever difference there may be between a fresh and seasoned state entirely depends upon the texture of the wood. But however carefully it may be dealt with in the timber-yard, further care during the process of manufacture is necessary to reduce shrinkage to the lowest possible degree, as much depends on how the wood is cut in relation to the position of the concentric rings. It will be found in boards that are taken out of the full width of a log, except a few in the centre of the log, that the shrinkage is $\frac{3}{4}$ in. in 12 in. from a fresh to a seasoned state. But in boards that are taken from logs that have been quartered, it will only be $\frac{3}{16}$ ths of an inch. On examining the ends of boards, it will be seen whether they have been cut on the quarter or otherwise. In those boards that are cut on the quarter, the concentric rings are situated at a right-angle to their surface, and those that have not been cut on the quarter, the concentric rings will pass from one side of them to the other, or parallel to the surface of the boards, as far as segments of circles can be said to be parallel with a straight line. Therefore, in cutting out stiles and framing, or for any kind of work that is subjected to a high temperature, it will give the best result to take it out of boards or planks in which the concentric rings form a right-angle with the surface. By using for framing purposes wood in which the concentric rings are situated in this way, twisting or warping is obviated, and shrinkage in the width of the stiles, &c., is reduced to a minimum.

Brown Oak.—It is generally thought that, when oak takes on a brown colour, it is in an incipient state of decay, but this is not correct, as no trace of decay in the true sense of the word is met with in the wood beyond the immediate centre, a condition which appears peculiar to large-sized and aged trees, doubtless arising from failure of the central roots. In a number of brown oak logs a large portion of the wood in the centre will be reduced to a useless state, but no indication of decay is found beyond those parts affected during the life of the tree, and after it has been cut down it may be left in the log form for years without fear of the damage being further increased, unless it is placed in contact with moisture



Fig. 1.



Fig. 6.

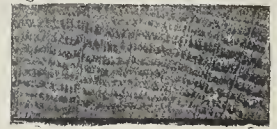


Fig. 11.



Fig. 2.



Fig. 7.

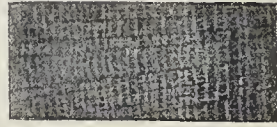


Fig. 12.



Fig. 3.



Fig. 8.

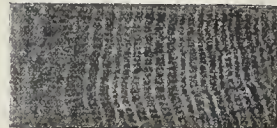


Fig. 13.

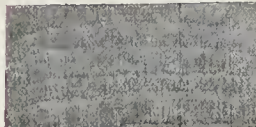


Fig. 4.

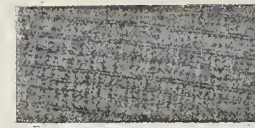


Fig. 9.



Fig. 14.



Fig. 5.



Fig. 10.



Fig. 15.

Fig. 1. English oak; texture of best quality; specific gravity 950.
 Fig. 2. English oak, best quality; specific gravity 939.
 Fig. 3. English oak, medium quality; specific gravity 892.
 Fig. 4. English oak, from top end of a plank 14 ft. long, medium quality; specific gravity at this end 549.
 Fig. 5. English oak, from the butt end of same example as Fig. 4; specific gravity at this end 833.

Fig. 6. English oak, medium quality; specific gravity 797; shrinkage 1 in 12 inches.
 Fig. 7. English oak; texture below medium, shrinkage 1 in 12 inches; specific gravity 771.
 Fig. 8. American white oak, best quality; specific gravity 864.
 Fig. 9. Ditto, inferior quality; specific gravity 723.
 Fig. 10. Baltimore oak; specific gravity 736.
 Fig. 11. Quebec oak; specific gravity 746.

Fig. 12. Russian or Riga oak, good quality; specific gravity 735.
 Fig. 13. Dantzic oak, good quality; specific gravity 803.
 Fig. 14. Prussian oak (Stettin), good quality; specific gravity 756.
 Fig. 15. Austrian oak, fair quality; specific gravity 612.

Sections of Various Oaks, Photographed from Slips of the Wood.

or situated in a way favourable to the growth of mould, which would lead to and set up decay of a nature distinctly different, thus showing that when the tree is felled the primary cause of decay in brown oak is removed. Therefore, it is reasonable to conclude that it is during the life of the tree that in many instances a considerable portion of the heart wood is rendered useless. That a brown colour is not peculiar to a species is obvious, as there is no characteristic distinction met with in the wood of a brown oak tree. In a tree that has its central roots deep into the soil, with a few lateral roots in the surface of the ground, the colouring matter is generally confined to the outside layers, and in some cases it is limited to one side of the tree,—conditions which make it very difficult to ascertain the state of the wood before the tree is opened. When the tree is cut down, those parts that have been fully sustained during the life of the tree will be found to be of a hard, bony nature, which, when thoroughly seasoned, is in every respect adapted for the manufacture of furniture, as it is of a firm, homogeneous texture, which admits of its being cut at any angle, and it is also fitted to sustain fine sharp lines, hence its value in the hands of the

carver, and for mouldings that have to be wrought out in high relief. A large piece of brown oak that is of superior quality is invariably sawn into thin boards 1-16th in. thick. There are several reasons for cutting this class of wood into veneer thicknesses: It is not only seldom met with, but it commands a high price, and considerable risk attends the purchase of it in the tree or log. In all cases these veneers are of a very limited size, from 3 ft. to 6 ft. long, and from 16 in. to 24 in. broad, and so irregularly formed that it will occupy a good workman several days to piece together and make up what would cover an ordinary sideboard top, 6 ft. by 2 ft., or an area of twelve superficial feet, as the pieces that are attached to each other must be similar in colour and form of grain, and the joinings made to suit the configuration of the fibres. The process by which veneers of this kind are prepared and made suitable for laying is the most tedious in the whole routine of cabinet-making. Brown oak, although highly suited for the manufacture of furniture, is not fitted for sustaining a heavy weight, so that it would not be safe to use it in work of a construction where strength is specially required. The most approved method in converting logs of

this kind, for the purpose of seasoning, is to cut them into planks, four to eight inches thick, and stack the planks so that they shall be protected from the weather and strong currents of air. After being thus placed for a period of eighteen months or two years, the planks may be freely cut into, and further seasoning, if necessary, more rapidly carried out.

We append a few illustrations of the grain of various oaks, photographed (the actual size) from slices of veneer prepared for the purpose.

NOTES.

WE may mention that the present issue of the *Builder* marks precisely the conclusion of the fiftieth year of its existence, the first number having borne the date December 31, 1842. As we have been in the habit of late years of issuing a special number in the first week of each year, we have preferred to celebrate our "Jubilee" in that number, which will be issued on January 7; but the actual chronological "Jubilee" of the *Builder* is to-day.

SOME interesting discoveries are being made on the site of the great abbey at Winchcombe, Gloucestershire, a building founded at a remote period of Saxon times; when the present secluded town of Winchcombe was the capital of Mercia, and of a separate shire. No trace of the building, which is described by the old chroniclers in terms to warrant the belief that it was of great extent, remained above ground, and the actual site of the monastic church was a subject for conjecture. Mrs. Dent, of Sudeley Castle, taking advantage of this period of the year being a dull one for agricultural and other outdoor pursuits, determined to have the actual site searched for, and to see if any remains existed beneath the surface. Workmen were employed under the direction of Mr. E. P. Loftus Brock, and a trench was dug across the most likely spot, with the happy result that the site of the great church has already been discovered. The outline of a great nave, 57 ft. wide by over 100 ft. long from east to west, has been revealed. But the walls are found to be demolished to below the paving level, except in a few unimportant places. The architectural remains at present found are very few in number, but they are sufficient to show that the nave was divided from its side aisles by large circular columns,—as at Gloucester, Tewkesbury, and formerly at Pershore,—of well-developed Norman work. The outlines of the central tower and the transepts are now being revealed.

AS we are now in the middle of winter it is timely again to call attention, as we have done on previous occasions, to the waste of fuel and the imperfect warming results in consequence of the use of open fires in the waiting-rooms at railway-stations. The cost of the aggregate amount of coal consumed in the waiting-rooms of such a line as the London and North-Western during the winter must be a substantial item, and it is quite certain that by the use of stoves, or of hot-water or hot-air pipes, money might be saved and the convenience of passengers increased. To sit around the fireside may be all very well in a drawing-room, but it is not desirable in a waiting-room at a railway-station, when by so doing the warmth of the fire is shut off from others. Again, waiting-rooms must of necessity be draughty, and this fault is made more disagreeable by the use of open fireplaces. The object to be attained in regard to the heating of a waiting-room is that, as far as possible, it should be warmed equally throughout. But this cannot be done with open fireplaces, which also in early morning or late at night are often found to be without warmth. We should be surprised that railway companies have not long ago abandoned the present system, were it not that in matters of this sort these large companies are singularly behind-hand.

LAST week the shareholders in Woodhouse & Rawson, Limited, a company well-known in connexion with the development of electric lighting, appointed a committee to investigate the affairs of the company in consequence of the apparently disastrous position of matters. About the same time the annual Parliamentary return relating to the gas companies was published. The contrast between the continued success of the gas companies and the slow progress of electric lighting is somewhat remarkable. In 1891 the number of public companies was 410 as compared with 392 in 1889, and there was a general increase both in the capital employed and in the business done. It is obvious that electricity must be a long time before it affects gas companies adversely, and there are so many openings for the employment of gas that, as the use of electricity increases, so new avenues are opened for the use of gas, and thus the work of the gas companies will continue. But in spite of this we can hardly doubt that the time will eventually come when, for most illuminating

purposes, electricity will supersede gas. But it will not for such purposes ever drive gas out of the market; there is some analogy between steam and sailing vessels and electric and gas methods of illumination. Sailing vessels for certain purposes are still useful instruments of commerce, and in years to come we may expect gas still to hold a useful though probably a subsidiary place as an illuminating agent.

THE *Liverpool Daily Post* publishes in its issue of the 27th some notes on St. George's Hall and its architect, which, though they contain nothing new, are well written as far as they go, and it is no doubt as well that *Liverpool* should be reminded from time to time that she possesses what is, as far as purely architectural design is concerned, one of the most remarkable English buildings of the century; and we are glad to see that the writer draws attention to the still unfinished state of the hall in regard to the sculptural decoration which was intended, but of which only a very small portion has even been attempted. We should have liked to see some reference to the fact that the proportions and intended effect of Elmes's interior have been entirely altered, and an elaborate tiled flooring hid from view, by the wooden floor put up, level with the side steps on which the order rests, "for one feast-night" (as Wordsworth has it), and never since removed, unless this has been done since the last time we visited the building. Not only are the proportions of the hall thus altered and the base line taken away from under the order, but the monumental effect of the interior is to a great extent impaired. We may observe also that the *Liverpool* journalist entirely misses the curious point in regard to what may be called architectural morality which the history of this building illustrates. The great hall, as stated in the *Daily Post* article, was built for musical festivals; but Elmes cared nothing for music, took not the slightest account of the acoustic properties of the room, and violently opposed the erection of the organ because he said (and quite truly) that it would spoil the architectural vista from the hall into the Law Courts. The result is what might have been foreseen; the hall, built ostensibly for musical performances, is one of the very worst music-rooms in the kingdom; the architect having obstinately neglected the very thing he was told to provide for. Elmes wanted the hall merely to be a grand *salles des pas perdus* for the courts, and it is almost a pity it was not left so; it would have been a superb thing of its kind architecturally, and quite worth doing on that account alone. Now it is spoiled architecturally by the temporary-looking wooden floor and the temporary-looking orchestra, which latter is large enough to spoil the architectural design and yet not large enough to provide for a first-class band and chorus; and so both architecture and music have suffered, and neither is properly represented, owing to the refusal of the architect to take into consideration the real problem laid before him.

WE understand that the governing body of the North London Hospital propose to collect a sum of 30,000*l.* with a view to the re-building of this, otherwise known as University College, Hospital, at the northern end of Gower-street. The existing premises were erected in 1846-7 for 150 beds; and, *teste* Peter Cunningham's "Hand-book to London," after the plans and designs of Alfred Ainger, architect.

THE Emperor of Austria is proposing the erection of a third Court Theatre in Vienna at his own expense. The position of the new theatre will probably be on the "Ballplatz," between the "Hofburg" and the Foreign Office. The building is to cost about a million florins. Baron von Hasenauer will probably be the architect, and in that case it is to be hoped his plans will not be

spoiled by official interference, as in the erection of his "Burg" theatre. The scheme of a third theatre is by no means as expensive as one we should appear. The staff of the present theatres is far too numerous, and a third stage could easily be supplied from it with but little extra cost. The Court Theatre are regularly crowded, and on "cheap" evenings could be filled five times over. On completion of the proposed theatre, this building would be the house for performances at popular prices, and would figure as a "People's Theatre" whilst the older houses could again regularly take "full money." One reason for taking the work in hand soon is said to be that the interval between the completion of the Court Museums and the commencement of interior work in the new Hofburg (combined with the decrease of architectural work in Vienna) is causing the staff of skilled plasterers usually employed on important buildings in Vienna to break up. These men would be of great service in the new Hofburg; and to keep them together it is necessary to find them first-class work.

DR. S. MONCKTON COPEMAN'S Report* to the Local Government Board on an outbreak of typhus fever in the Wigan and Ince-in-Makerfield Urban Sanitary Districts, deals in part with the condition of what he characterises as the worst slums in Wigan; this portion of the town (St. Patrick's Ward) contains a number of courts, the houses in which are in many instances built "back-to-back." "Owing to this method of construction, the only means of securing ventilation for many houses is by means of a window (generally securely fastened up) in each room, and by the street door of the lower room. At the same time, the floor and cubic space of the living-room are considerably encroached upon by a large bed, often of the four-poster type, which accommodates several members of the family at night. Furniture of other kinds, however, for the most part there is none, beyond, perhaps, a small table and a broken chair. Not infrequently there is an additional room below the level of the street, at one time used for a weaver's loom, which, being no longer put to this purpose, is time after time made a convenient receptacle for the disposal of cinders and other household refuse, such as potato-peelings, cast into it through the aperture which was once a window." Further on the report continues:—

"The Sanitary Committee have made some attempts to improve the state of things prevailing in this part of the town, but their efforts have in great measure been rendered futile by the incorrigible habits of the people. Thus, owners have been required to supply doors fitted with locks to the privies, a block of which, separated from the houses, is provided for the use of the inhabitants of each court or alley, the occupier of a house being supposed to be held responsible for the due cleanliness of the particular closet of which he has the key. These closets are provided with metal pails beneath the seat, which are periodically emptied by the town scavengers. As a matter of fact, however, I found in certain instances that the door had been broken down, and sometimes altogether removed, having probably, as I was informed, been chipped up for firewood. In other cases, the pails had disappeared, having been found useful as wash-tubs, while the condition of the actual closet was often foul in the extreme. . . . Some of the yards are altogether un paved, though in certain cases this defect has been partially amended quite recently in consequence of the action of the sanitary authority. Where this has not been done, the surface is often extremely uneven, the hollows becoming the site of stagnant pools of stop-water. Such unevenness was, in many instances at any rate, due, as I proved by the use of a spade, to the presence of masses of house refuse, which extended in some cases to the depth of a foot or more from the surface."

In such a case as this, where a population of a whole district appears to be absolutely reckless as to all sanitary conditions, it is of the more urgency that official authority should be applied to compel them to a better state of things. The first move should be to condemn the back-to-back houses, and with regard to some of them we understand from

* Published by Eyre & Spottiswoode.

the report that they are to be pulled down. Dr. Copeman appears to have spoken his mind plainly to the local authorities, and it is to be hoped that good may spring from his visit.

A CORRESPONDENT writes:—"Several very interesting discoveries of mural decorations have been lately made in the Church of St. Margaret, Wellow, situate about three miles to the west of Romsey. The Church is Early English, with two Decorated windows, inserted in the north and south walls of the nave. There is a Flamboyant 'leper' window close to the priests' door (Early English), in the south wall of the chancel. Over the east window (three lancets inserted in a late Norman arch) are two crowned heads with scroll ornament, thirteenth century, of which a short account is given in the 'British Archaeological Association's Journal,' vii., 63, and in the 'Archaeological Journal,' ix., 117. In April last, further traces of colour in the chancel were discovered: these were followed up, with the result that all the eastern wall of the chancel has been cleared of whitewash, and underneath the whitewash very graceful patterns of roses and lilies in *tempera* have been found. Three consecration crosses of a deep crimson colour were also brought to light, two on the east wall of the chancel and one near an umbray in the north wall, probably just within the ancient altar rails or sanctuary. In addition to this, a fourteenth-century piscina with double drain was found in the south wall, blocked up with remains of ancient tiles, and completely concealed from view by whitewash. On the same wall a striking representation of the murder of Thomas a Becket was rescued from beneath many coats of stiff whitewash; four figures are very clearly seen, being those of the Archbishop and Edward (trim on one side, and on the other two of the knights in armour, one having a shield bearing three coped heads, either bear or boar, the arms of Fitzure or Le Bret. On the north wall of the chancel are traces of what seems to be a large nimbus, and in one of the window splay a mitred figure with inscription above EDMVN, probably that of Edmund Rich, Archbishop of Canterbury (1234-1240), about the date of the present church. Quite recently the walls of the nave were examined, and after removing several coats of whitewash three distinct layers of decoration were successively met with. Opposite the main entrance is a colossal figure of St. Christopher bearing in his arms the infant Saviour; there are also other figures which have not yet been clearly deciphered; possibly one may be the hermit generally associated with St. Christopher, and the others may belong to a representation of St. George and the Dragon. Three ancient dedication crosses were found; and also 'scoring' not quite the same as that on the east wall of the chancel. This goes completely round the church, the walls showing signs of it wherever they have been tested. Upon the whole these decorations may be said to be in excellent preservation, the slight variations in the work of a similar character, in different parts, suggesting many points of interest to archaeologists and students of mural decoration. The most recent discovery is a holy-water stoup inside the main door of the church, on the south wall of the nave. It has evidently received severe treatment at the hands of Dowding's followers. Dick Norton, one of Cromwell's colonels, lived at the Manor Farm, only two minutes' walk from the church, and it is highly probable that much of the work of destruction was done during the Commonwealth. It may be added that one of the three bells in the old wooden belfry bears the inscription, 'Sancta Maria ora pro nobis,' in Old English characters; its date is said to be about 1440: not many of these pre-Reformation bells are now in existence. The registers go back to 1570. They have been carefully compiled by Mr. C. W. Empson, son of a former vicar, and published by Messrs. Eyre & Spottiswoode."

AS we expected, the Society for the Protection of Ancient Buildings has attacked Mr. T. G. Jackson for his proposed work at St. Mary's, Oxford, especially for a supposed intention to pull down ancient statues and replace them with modern ones; and as usual, the Society has got its facts wrong. The following is a portion of Mr. Jackson's reply (published, with the Society's letter, in the *Times* of Wednesday):—

"You say that 'the impression made on the beholder is due largely to the antiquity of these statues.' From my printed report you would have learned that their more important parts have an antiquity of only 40 years; and I have since been informed, though I have still to verify the statement, that two of them were entirely renewed at that date.

With the abstract principles your letter enunciates I quite agree, and I need hardly say I deplore the ruin of these interesting sculptures as much as you do,—perhaps even more, because I know them better. But I can hardly advise the University, as you desire me, to let them remain and continue to shed their heads, hands, and other members, as they have lately done, to the peril of the church and the passers-by. Nor can I advise them to remove the statues and leave the niches empty. Nor need I doubt our ability to do as well as our predecessors of forty years ago, whose work you mistake for genuine sculpture of the fourteenth century."

After this, the S.P.A.B. will probably see the wisdom of letting Mr. Jackson alone for the future.

ANDREWS'S CONCENTRIC WIRING.

PERHAPS the only advantage that gas has over electric lighting, from an architect's point of view, is the ease with which gas-piping can be handled, carried wherever it is desired, concealed in the walls, and in general prevented from interfering with the decoration and design of the building in which it is used. The "leads" for the electric light are not, for the most part, nearly so manageable. They must be protected from damp, from rats and mice, and from the chance of mechanical injury; yet they should be readily accessible in case of need arising to repair a fault. For this latter reason they ought not to be deeply embedded in the walls, and the usual method of concealing and protecting them is by a wood-casing, grooved to carry the wires. Considerable ingenuity has been shown in designing this casing so that it should be unobtrusive, and even ornamental, but it occupies considerable space, and the more severe the architecture of the building the greater the difficulties to be overcome in this system of wiring. The opponents of this system urge as a considerable objection that a slight leak between two contiguous wires, due, perhaps, to the casing being damp, may char and ultimately set fire to the wood, starting an arc before the current increases sufficiently to "blow" the fuse.

Messrs. J. D. F. Andrews & Co. claim that their system of concentric wiring, which has been greatly improved during the last two years, is free from the disadvantages attendant upon the ordinary system, and a short account of its details may prove of interest to our readers.

Fig. 1 shows a section of a large cable (for smaller sizes there is only one layer of external wires); the inner conductor is of copper wire, covered with a very thin coat of pure rubber, surrounded, as usual, with a separator, and over this is a layer of vulcanised rubber. The outer conductor consists of galvanised iron wire, of such cross section that its resistance may be the same as that of the inner one; it is generally uninsulated, though, if it be intended to be placed in plaster, it is covered with a bituminous compound to protect it from chemical action. For the smaller "leads," copper tape or a braided sheath of lacquered copper takes the place of the galvanised iron.

The outer conductor thus serves to protect the inner, and there is no possibility of any leak outside the cable; if any fault arises, the insulation at the fault is destroyed, and a short circuit results, so that the fuse goes at once.

A special feature of this system is the simplicity of the joints. The outer wires being removed, the insulating material is tapered off, laying bare the inner wire; the joint is then made and soldered, and afterwards wrapped round with pure rubber, *p*, fig. 2; outside this comes a separator of rubber and soapstone, *z*, and then a layer of rubber mixed with sulphur,

S. The joint is then wrapped over with silica cloth, *a*, and copper sheathings, *a*, replace the outer conductor.

The whole is now placed in an iron mould which is screwed down upon it, and fusible metal is poured in, the heat from which vulcanises the rubber of the joint. This method is both cheaper and safer than the old one of enclosing the joint in a metal box, which was apt to make had contact with the iron, and give rise to sparking. In some cases, and especially in the fittings, the outer conductor is a tube of brass, or huruished copper. The joints to the fittings are made in the manner just described.

Figs. 3 and 4 show a wall socket, the inner wire ready for jointing to the central wire of the leads being attached to a contact piece C, which is kept in position by an insulating composition resembling stone; the inner conductor of the fitting being kept in good contact with this by means of a spring, when the fitting itself is screwed into the socket. In fig. 5 the switch used with these fittings is shown in section. The central wires are connected to two contact pieces, A A, insulated from each other; a brass plate B is held clear of these contacts by a spring, C. When the switch handle, *e*, is turned, a cam mechanism forces the plate into contact and closes the circuit.

From figs. 6 and 7 the arrangement for hall-and-socket swivel and joints can be seen at a glance, while fig. 8 shows a flexible tube, the only detail in which gas-fittings are not closely imitated. The larger switches are made on nearly the same pattern, but the contact-disk is made to rotate with the handle, so as to secure a rubbing contact. The fuse consists of a plug, P, fig. 9, wound round with a tin fuse wire, attached to contacts and enclosed in a brass box. A spring, S, keeps the contacts of the plug in contact with those of the box, and a fixed pin passing through a hole in the plug secures that the contacts shall be opposite each other. It is impossible to print in a fuse of the wrong size.

Fig. 10 shows a switch and fuse-box united together. Since a fuse is provided only for groups of some ten or twelve lamps, the smallest wire used is No. 15 S.W.G., which is able to carry with safety a larger current than that which would blow the fuse.

For self-contained installations the Andrews system offers many advantages, but the uninsulated exterior conductor is likely to prevent its coming into anything like general use.

NOTES ON LOW SIDE WINDOWS AND HAGIOSCOPIES.

THE small openings occasionally found in the external walls of chancels, generally on the south side, have been of late years frequently spoken of by ecclesiologists as "low side windows;" though they have always been more popularly known as "leper-windows." We can only look upon this survival of a name as a lingering piece of evidence of the extent of the scourge of leprosy in days of old. Modern antiquaries, if must be owned, dismissed this clue as to the purpose of these openings, and have assigned a variety of uses for them; nevertheless they have not undermined the popular impression that they were inserted for lepers to be present at religious services, and yet kept at safe distance from the rest of the congregations.

These low side windows must not be confounded with hagioscopes (better known as "squints"), though they resemble them in so far as they are apertures made through the thickness of the walls of our ancient ecclesiastical buildings; for, in other respects, they differ from them very considerably. Low side windows, or lychoscopes, pierce the external walls; and, as has been said, generally, though not always, the south side of the chancel, near its junction with the nave, has been chosen for their insertion; hagioscopes are found in the interiors of the fabrics, and frequently in the piers of chancel arches. In our modern places of worship, no matter to what denomination they may belong, neither the one nor the other finds a place. They are both features that belong to our ancient churches only; and whilst these venerable edifices were less ancient than they are now by, perhaps, three centuries, lychoscopes were, in some instances, blocked up, as though, in the irresistible mellowing of opinion, they were no longer approved or required. Yet they were once freely used, generally, throughout the length and breadth of

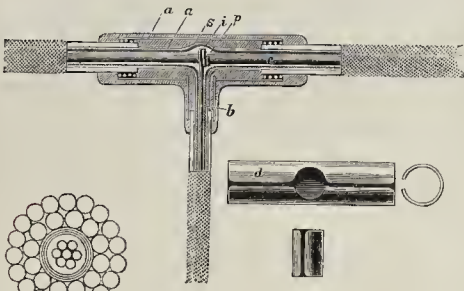


Fig. 1.

Fig. 2.

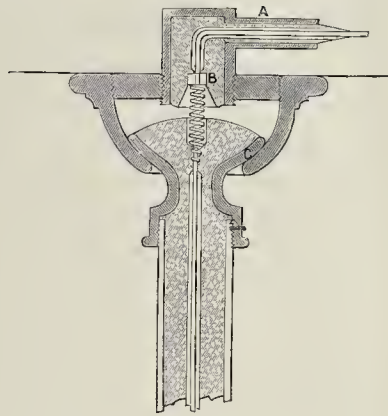


Fig. 6.



Fig. 3.

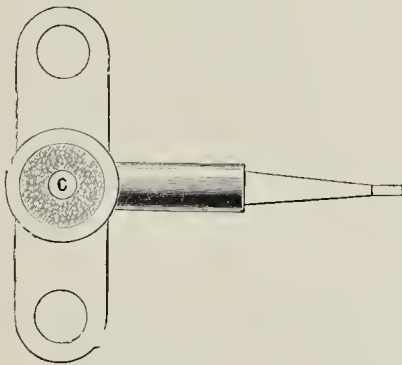


Fig. 4.

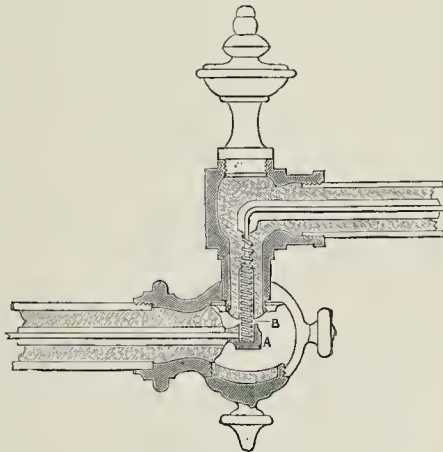


Fig. 7.

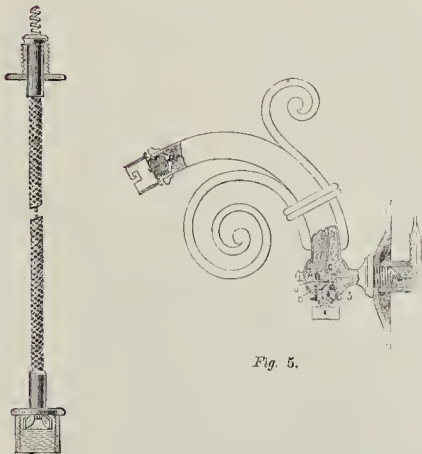


Fig. 5.

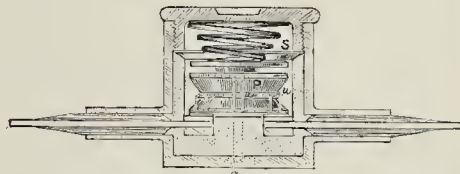


Fig. 9.

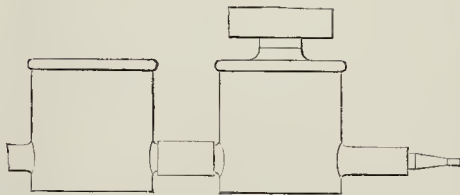


Fig. 10.

Fig. 8.

Andrews's Concentric Wiring for Electric Lighting.

the land, and especially profusely in some particular counties; though, on the other hand, many churches have evidently never possessed them. In some ancient edifices only a pich in the external masonry indicates that they once existed; in others, their outlines have been left undisturbed, only their openings have been filled in carefully with masonry; and, in a few instances, they remain just as they were made, almost as if for our mystification. Hagioscopes seem to have been from the first of rarer occurrence, and to have suffered less from alteration of opinion as to their usefulness.

It is in the midland counties that lychoscopes, or low side windows, are now found most abundantly. One example was brought into notice only a short time ago in the course of the restoration of Chilver's Coton Church, Warwickshire, the edifice that, under the name of Shepperton Church, was mentioned so minutely in one of George Elliot's clerical sketches. This is on the south side of the chancel, much below the level of the other windows; and after we have noted the pew that was occupied by the gifted writer in the days of her youth, and glanced at the mural monuments of the persons whose sad experiences formed the foundation of one of the most pathetic of the sketches, and at Amos Barton's pulpit, as well as at the Slogers' Gallery, with its external staircase, it has an attractive interest of its own that enchains. Examples are to be seen in many of the Huntingdonshire churches, and they are common in Derbyshire, Lincolnshire, and Northamptonshire. There are also several to be seen in Kentish churches. Occasionally they take the form of an elongation of a window, or of one light only in a window where there are millions dividing it into two or three. In Aldwinkle Church, in Northamptonshire, the westernmost window in the south aisle has been lengthened in this way, and the lower half of it was made to open and shut, as we may see by the hooks left for the hinges, and the bolt-holes that remain. Another instance of a window thus elongated may be seen on the south side of the chancel of Wensley Church, in pleasant Wensley Dale, Yorkshire. A window with a transom, and the lower part screened with a wooden shutter, occurs on the south side of the church at Hartley, in Kent.

There is an example in one of the two memorable churches in Bywell, on the Tyne. These two edifices are of great interest, both having been built before William the Conqueror set foot in England; but only one, St. Peter's, has a low side window. There is a length of hoary Saxon walling in this old church; there is a Flansaget tower standing on a Norman foundation, very stalwart still, with holes in the doorway for bunge bolts and bars; there are two ancient bells, one of which is an alphabet bell, and so supposed to express all that can be expressed by language in the way of adoration and praise, and the other bears an inscription in Latin stating "I am called Horn and I call the sleeping people to arise;" and there are various other vestiges of old times in it, such as a small chantry with a large heavy altar-slab with five attesting crosses wrought on it, and another with the sculptured effigy of a nameless knight in it; and, as stated, among them, low down on the south side of the chancel, is a square-headed low-side window, locally known as "the leper window."

In Ovingham Church, in the same county (well-known to admirers of Bewick), there is another example. There are Saxon remains in this edifice, likewise, consisting of a noble tower; and in the chancel, which was re-modelled and probably extended in the Early English period, there is a line of long and slender lancet-windows placed alternately with strong and sturdy buttresses; and, so low down that it does not rise above the bases of the lancets, and, though on a very small scale, likewise lancet-voiced itself, is the peculiar opening in question, which is also locally known as a leper-window.

In north Northumberland, in the Archdeaconry of Lindisfarne, there are several other churches with these peculiar windows, small, low, and deeply splayed, pierced through the thick walls of their respective chancels, below the line of the rest of the fenestration. The grand old parish church at Morpeth has an unusually large one on the south side of the chancel. This part of the edifice is well lighted with traceried windows, and there are three canopied sedilia, each one step above the other to suit three steps on the floor where they are

placed, and various interesting features, such as two "squints" through the piers of the chancel arch, and among them this curious opening below the other windows. Mitford Church has another. A local saying asserts that Mitford was Mitford long before Morpeth was Morpeth; and the size, age, and superiority of the church bears out much of the claim. It is a fine structure, with sufficient Norman work still left in it to show that the Norman possessors of the manor built the church with north and south aisles. Their chancel was taken down in course of time and the present large, long, and light one erected instead of it; and close to its junction with the chancel-arch, below the line of the bases of the six beautiful lancets along its length, the builders inserted this deeply-splayed small opening. There are other examples at Bothal and Hartburn. Bamborough Church has one on the north side of the chancel, as well as a fine hagioscope in the southernmost part of the chancel arch.

Among the surmises that have been put forth by antiquaries and ecclesiologists as to the uses of these peculiar windows, besides the supposition that they were intended to give lepers standing, or kneeling in some cases, an opportunity to see and hear somewhat of the services in course of progress within the building, and to partake of them, may be mentioned a suggestion that they were intended for offertory windows; and another that they were made for the convenience of watching the lights upon the altar at certain seasons; and a third, that they were contrivances for the purpose of conversing with the clergy without entering the building. A still more far-fought explanation has been tendered to the effect that they were made in commemoration of the wound made by the spear at the Crucifixion, just as the nave of a church has been fancifully supposed to represent the body of Our Lord, and the transepts to show His extended arms, and the chancel His head. The most recent of all suggestions, made by a writer in the *Athenæum*, is that they were made to admit of the rigging of a hand-hell by a person who could lean out of them for the purpose, and thus inform all residents within hearing that the services had reached a particular stage with which they were acquainted, and which they wished to mark with special reverence. Occasionally we come across ancient hand-hells that may have been used for such a purpose. One was dug up not very long since in Bewick Chapel, near Elingham, in Northumberland, $\frac{1}{2}$ in. high with a straight handle $5\frac{1}{2}$ in. in length.

Hagioscopes could not have been used for the same purpose as these so-called leper windows. They merely give a sight in a slanting direction of some distant part of the edifice to those who are already within it, and the point of view to which they are directed is not always the same. We might suppose from the position of some of them that they were intended to give a view of the altar, or of the officiating minister, to those who had to be content with places in the side-aisles during the services; but the position and direction of others do not admit of this explanation. Eastbourne Church has an example that does not lend itself to such a probability. This old sea-side window in Sussex church has several unusual features. The chancel, which is rich with Norman arcading, instead of being a step higher than the nave, as is the general rule, is a step below the level of that part of the fabric, and so follows the slope downwards of the hill-side on which the edifice is built. On the north side of the chancel is an Easter sepulchre; on the south side are three sedilia and a piscina; and in the east wall is a doorway leading into a small chamber that appears to have been thrown out in that unusual position for a vestry, or some other special purpose. In the southern pier of the chancel arch there is a door leading to the staircase, in the thickness of the masonry, that once wound up and opened out on to the roof loft; and in this same pier is a hagioscope, the slight-line of which is not directed to the altar, but into the south aisle, which contains a tomb, which may be that of a benefactor. Sometimes these "squints" are found in pairs, as in the chancel arch in Croft Church, Durham. Few counties are without examples, though they are by no means common. In Bridgwater Church there are three hagioscopes opening out a view through three successive walls. In East Farleigh Church, Kent; in Tilbrook Church, Bedford-

shire; and in St. Lawrence's Church, Castle Rising, they have been pierced through different features. In St. Mary's Church, Llantwrog, in the beautiful vale of Clwyd, North Wales, there is a curious oblique opening at the east end of the north aisle, which is directed, not towards the Communion-table, but away from it.

Few of the items left in our parish churches by those who have gone on heroic as give us more material for speculation than these curious openings. In the case of leper windows, where there are traditions of leper hospitals having been in the neighbourhood of the churches in which they remain, our mystification is by no means lessened, because there is a much larger number of examples which never had any association with establishments of the kind. As lepers and leprosy are mentioned more than fifty times in the sacred writings, and some of our Lord's miracles accomplished the cure of the terrible affliction, we may assume that devout persons, in old times, recognised and felt a special sympathy for sufferers from this malady; but whether these windows were made for their use will probably remain a matter of doubt. The survival of the name is not without interest. S. W.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

THE Commission has commenced an inquiry into a source of supply which had been mentioned incidentally, but not actually proposed on behalf of the Companies or the Conservancies. This source is the Chalk, but the water is not to be obtained by wells in the Lea Valley, to the possible detriment of Hertfordshire, nor by increased pumping in the district of the Kent Company. It is to be obtained by intercepting the water from the chalk that is escaping into the sea,—a source that is being utilised, on a small scale, for the water supply of several coast towns. The works that would be involved would not be wells or reservoirs, but would be long tunnels with radiating branches.

The Commission held its last sitting for the year on the 16th inst.* It then appeared that the Commission had invited Mr. William Whitaker and Mr. William Topley, F.R.S., of the Geological Survey, and Mr. E. Easton, to report upon this phase of the subject. Mr. Whitaker accordingly reported on the chalk of the London basin, and produced detailed notes of swallow-holes in the Thames basin, and also of springs in North Kent; while Mr. Topley reported on the whole Kent area, and on the feasibility of utilising the water that is running to waste into the sea and tidal rivers. Mr. Whitaker and Mr. Topley were examined, and the examination of Mr. Easton was interrupted by adjournment to some time next year. Mr. Whitaker's statement and evidence were taken first, as leading up to those of his colleagues.

The Chalk of the London Area.

Mr. Whitaker divided the subject into three parts, and embodied the following statements with detailed exemplifications:—

1.—*Thickness and Divisions of the Chalk.*—Over the area in question the total thickness of the Chalk varies from 623 ft. at Stratham to 1,146 ft. at Norwich, and in the latter case the topmost beds are absent; so that the full thickness, in some part of Norfolk, may be 1,200 ft. or more. This figure, however, is exceptional, the nearest to it recorded being 890 at Harwich. At East Horsley, in Snrrey, a thickness of 817 ft. has been proved, but, generally speaking, we find less, and over a large area 700 ft. is not reached. It seems that the Chalk thins toward London (where 650 ft. may be taken as about the mean thickness), not only from north and south, but also from east and west. Of old the Chalk was usually divided simply into Upper and Lower, the former being also known as the Chalk with flints. Of late years, however, a further division has been made by the splitting up of the old Lower Chalk into Middle and Lower. This last, too, is often again divisible, by the separation of its lower member, the Chalk Marl. The Upper Chalk of this great district is marked by the general prevalence of flints, mostly as separate nodules, in layers or scattered; but also in continuous sheets. Often, however, we find a considerable thickness in

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 426, 436, 450, 468, 503; and current volume, pp. 10, 22, 47, 71, 82, 103, 125, 294, 316, 338, 353, 375, 396, 438, 476.

which flints are very rare. The Middle Chalk is, on the whole, without flints; but sometimes a few flints are found in it toward its middle part. It is thick-bedded and jointed. Its top is generally distinctly shown by the presence of a hard bed, a cream-coloured crystalline limestone where well developed, and with green-coated nodules. This is known as the Chalk Rock, and is often to be seen in Hants, Wilts, Berks, Oxon, Bucks, Beds, and Herts. It is less clear in Essex and Cambridgeshire, has not been noticed in Suffolk, and but one section is known in Norfolk. In Surrey and Kent, though no bed with the distinct lithological character of the Chalk Rock has been seen, yet microscopic investigation proves that it is represented. The Lower Chalk is distinguishable from the Middle Chalk by the much thinner character of its beds, the planes of bedding being sometimes emphasised by marly partings. It is often slightly clayey, and the Chalk Marl is sometimes particularly so. Any attempt to divide the chalk into White Chalk and Grey Chalk is inconvenient. Colour is generally a very bad guide in making stratigraphic divisions, and the greyness of chalk sometimes depends on its dampness rather than on any inherent colouring. As the divisions Upper, Middle, and Lower Chalk have been mapped, more or less completely, by the Geological Survey, in the London Basin, from Hants and Wilts through Berks, Oxon, Bucks, Beds, Herts, Essex, Cambridgeshire, and Norfolk (partly), and also outside the London Basin, in parts of Somersetshire, Dorset, Wilts, and Hants, and all through Sussex, they may be accepted as practical.

II.—Flow of Water in the Chalk.—The passage of water through the chalk occurs in three ways:—1. Through the pores of the rock. As these are very small,—sometimes, indeed, practically closed,—this is, of course, a slow process, and results, in underground work, merely in the weeping or oozing out of water from the cut surfaces. Nevertheless, there may be exceptional cases where, from greater openness in the rock, a greater quantity of water may pass through. 2. Along planes of bedding, or the originally horizontal layers of which the Chalk is built up. Sometimes the passage of water along these planes is insignificant, but sometimes it is very marked, and this naturally occurs where the bedding is more definitely somewhat open, as along layers of flints. Where, too, marly layers occur, their more impermeable character, as compared with the rest of the Chalk, is likely to cause an outflow; so also may an alternation of more open with more compact rock. 3. The chief means of water-communication through the Chalk is by the more or less vertical fissures that occur, either along planes of jointing (structural planes produced after solidification, and not connected with bedding), or, more rarely, along faults or cracks. Joint-planes are universal in the Chalk, and mostly very plentiful, though often they are so closed as to allow the passage of but little water. The planes of master-jointing are connected by other planes running across them. The fissures naturally form a means of communication, not only more or less vertically downward, but also lengthwise along their course, from the higher to the lower grounds. The same, too, would be the case with planes of bedding, where they are fairly marked; but sometimes too much may have been credited to bedding-planes. From the fact that the Chalk dips inward, from its generally lofty escarpment to the lower ground formed by the margin of the Tertiary Basin, and that, therefore, the dip-slopes of the Chalk form by far the broadest parts of the outcrop, it follows that the water in the Chalk would have a general flow in that direction, or inward to the central part of the Basin. This flow in the direction of the dip is, of course, subject to lateral change where valleys are cut through the Chalk, to some depth, and an outlet for water is made. In smaller tracts, the slope of the surface does not go with the dip of the beds. The one constant and recognised exception is the face of the great escarpment, that is the outward and generally abrupt slope of the chalk; the crest of the escarpment forms a watershed, and the underground water flows outward, in the direction of the slope, which is the reverse of the dip. The many springs that occur at or near the foot of the escarpment are proof of this flow. In the more exceptional cases where the escarpment is not a simple ridge, but a double one, the two ranges some

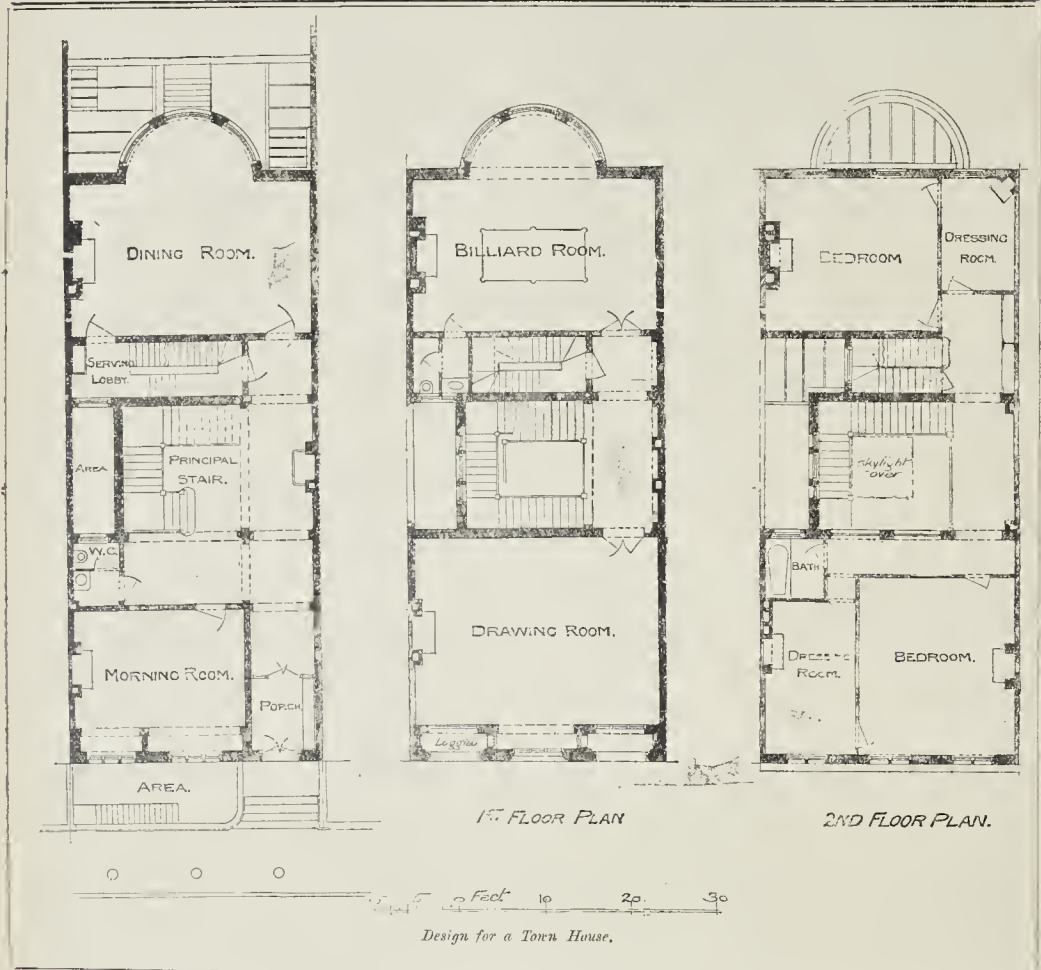
way apart (as near Luton), there is a greater area subject to this flow against the dip, and still more so in this case where, instead of the usual bold abrupt ridge, we have a more gentle and therefore a broader slope (as in Norfolk); so that over a tract some miles in width the plane of saturation will slope in a direction opposite to the dip. Another marked exception is given by a range of sea-cliffs, where this runs along the dip, or at no very great angle with the direction of the dip, as on the coast of Kent, in which case the water finds a ready outlet along the free margin formed by the cliffs, and takes a shorter course, more or less across the dip, instead of a longer one following the dip. In short, the underground flow depends generally on the surface-contour; the water can generally flow across the bedding when it can more speedily reach an outlet by such a course.

III.—Relation of the Structure and Position of the Chalk to Water Supply.—The greater part of the area of outcrop is formed by the Upper Chalk, which, rising up from beneath the Tertiary beds, reaches right on to the top of the great escarpment, or bounding-ridge, except where cut through by valleys, which lay open lower beds. Where the escarpment is all in one, as is commonly the case, and is abrupt, it follows that the outcrop of the lower divisions is narrow, very narrow, as compared with the broad tract of Upper Chalk inward from the escarpment. This division, too, is the thickest of the three. The Upper Chalk, therefore, must be the great gathering-ground for water, and, as it sinks downward to low levels, to the boundary of the Tertiary beds, so that the plane of saturation comes near to the surface of the ground, and sometimes up to the latter, it follows that as a general rule, this division must be the great water-yielding one, and that works for vast supplies, over most of the area. In question, must be established near the outcrop from beneath the Tertiary beds, where the plane of saturation, though near the surface, is at a low level, so that underground water tends to flow down to such works and to replace that pumped out from them. The place taken by the Upper Chalk as the great water-bearing bed may, perhaps, be owing to its favourable position rather than to its structure. There is nothing, as a rule, to prevent water sinking down through the Upper into the Middle Chalk, and we find that at high levels, toward the escarpment, the former is dry, its base being above the plane of saturation, which sometimes may be very far down in the latter. The Chalk Rock, which forms the top surface of the Middle Chalk, where well developed, is favourable to the passage of water along it, being usually markedly jointed, and so, when below the level of saturation, is often a water-yielding bed; but when above that level there is nothing to stop its being dry. Where the escarpment forms a long gentle slope, as in Cambridgeshire and Norfolk, the outcrop of the Middle Chalk is fairly broad, and much water must sink through the rock and find its way out in the springs on the northward slope. Where, too, the outcrop of the Middle Chalk, though usually much less in width, is cut back by valleys that breach the upper part of the great escarpment, as is the case with the valleys of the Lea (in Beds), of the Gade and of the Bulbourne (in Herts), of the Misbourn and of the Loudwater (in Bucks), of the Thames itself, and of the Lambourn and of the Kennet (in Berks and Wilts), there, again, much water is collected by this division, and many springs issue from it and feed the Thames by its various tributaries. The Melbourn Rock, at the base of the Middle Chalk, is sometimes water-bearing, by reason of the bed next below (known as the Belemnite Marl) being mostly of a rather clayey character; so that, under favourable conditions, it may delay the downward passage of water. The Lower Chalk, being generally more clayey than the upper two divisions, is less free to the passage of water. There are, however, places where, from favourable conditions arising, much water occurs in the Lower Chalk. Of fairly large supplies got from beds below the Upper Chalk in the basin of the Thames, Luton, and the Chiltern Hills Waterworks (near Tring) may be mentioned. Several smaller towns, too, depend on the same beds, along the northern outcrop of the Chalk. On the south the outcrop of the lower beds is narrower, but various wells have been carried through the Upper Chalk to these beds, as in the case of the Kenley and Caterham Waterworks. Maidstone gets a great part of

its supply from Lower Chalk springs, and Folkestone gets the whole. As a general rule, there is more or less communication downward through the Upper and Middle into the Lower Chalk, so that the water in the Chalk may usually be treated as a whole. Nevertheless, there are cases where, from the occurrence of less permeable beds in the Chalk over certain tracts, there may be independent supplies at various depths. In conclusion, Mr. Whitaker says:—"Though there are general rules as to water in the Chalk, these must not be taken as absolutely universal; we must be ready for exceptions, and sometimes for great ones. To give what may be called a political illustration, whilst there are imperial laws regulating the conduct of water in this Chalk Kingdom, yet the various provinces of which that kingdom is composed need special legislation of their own; rules that hold in one province may not accord with the manners and customs of another. In short, it is a case not only for Imperial but also for Local Government."

Swallow-holes in the Chalk.

In his Memorandum on Swallow-holes in the Chalk of the Thames Basin, Mr. Whitaker mentions over thirty localities in which they occur, and says:—"Swallow-holes,—that is, more or less funnel-shaped hollows which swallow up streams that run into them,—are common. They are formed by streams which, rising in the higher ground, flow down the escarpment of the Tertiary beds, until they reach the more porous and jointed Chalk, into which they sink, or until they come within a short distance of that rock, when they work their way into it through the few feet of the softer overlying beds. In the course of time, through the chemical action of the carbonic acid in the water and the mechanical action of the water itself, funnel-shaped basins are worn in the Chalk and the beds above, the operation being made more easy by any pre-existing fissures. These hollows are often thickly overgrown with vegetation. The streams may sometimes be seen running down them, though sometimes they merely flow into a small pool, the level of the water in which remains the same, notwithstanding the constant inflow. These swallow-holes mostly occur at or near the junction of the Reading beds and the Chalk, and they are therefore of much use in drawing the line between these formations, especially where there are no sections. They sometimes occur, however, at a distance from the Tertiary beds, and sometimes well within their boundary (where the lower beds are sandy); both these conditions may be seen in the Mims Valley. They occur also where the Thanet Beds are present (between the Reading Beds and the Chalk), especially where these are comparatively impervious, as in East Kent. The sinking of the river Mole into the Chalk has been often alluded to. This occurrence, of course, is not exactly of the same kind as the ordinary swallow-hole; but is allied to the ordinary swallow-hole, and is called by the railbourns, or occasional streams in valleys usually dry. The Mole, though usually a continuous stream, after very dry weather sinks in parts of its course through the Chalk, its exceptional underground course being after dry weather, whereas the exceptional breakings out of the railbourns are after wet weather. The four things,—swallow-holes, railbourns, sinkings, rivers, and springs,—are all connected; all are concerned with the underground water in the Chalk, and all depend on the power of the Chalk to absorb water. The brook that flows along the valley from Rabley to North Mims has no outlet (at all events in ordinary seasons); but the water is lost in swallow-holes, which thus receive the drainage of some twenty square miles of country. From South Mims to Hatfield Park the many swallow-holes give only an approximate boundary between the Tertiary beds and the Chalk, owing to the amount of sand in the Reading beds, which results in the swallow-holes being sometimes formed well within the boundary. Those at Potterells, eastward of North Mims, have been alluded to by Mr. Hopkinson before the Commission and in 'Trans. Herts. N. H. Soc.' vol. vi. It should be noted that some of the swallow-holes near North Mims, in which this branch of the Colne is lost, differ from those along the junction of the Chalk and the Tertiary beds, and are more allied to those of the Mole, the stream being lost because the saturation-level is below the bottom of the valley, except after wet seasons. [Continued on p. 522.]



Illustrations.

DOORWAY, CONVENTO SAN PABLO, SEVILLE.

HIS drawing is by Mr. A. N. Prentice, and was exhibited at the last Royal Academy Exhibition. In regard to the original work, Mr. Prentice writes:—

"The great charm of this doorway lies in its colour and the variety of materials used in its construction. The striped portion is of red and yellow coloured brick in courses 1½ in. deep, and so finely cut and fitted together that a knife-blade cannot be inserted between the joints. Inside the arch, and immediately over the door, is a marble *escudo* bearing the arms of the Emperor Charles V., supported on either side by shields and ornament with a yellow ground painted on glazed tiles. Following the line of the extrados of the arch is a magnificent band of decorated tile work, with deep orange-coloured ground and rich pattern in white and blue. The circular plaques are very interesting, and, although not of Spanish design, are very successfully introduced. The centre one,—representing the Nativity,—is undoubtedly a Della Robbia, and the other six are distinctly Flemish in character. The draperies of the four angels in the spandrels also suggest Flemish influence, as well as the two square panels with I. H. S. on deep rich brown background. The little panel with inscription shown underneath the drawing is a fac-simile of a tablet with the artist's name and date, 1811, to be found among the scroll work to the left and below the plaque representing St. Helena and the Cross. In the general lines of the doorway and the profiles

of the mouldings round the arch it is easy to trace the hand of an Italian designer. The door forms the entrance to the chapel of a small convent situated in the hack streets of Seville, and has somewhat escaped the attention of visitors owing to its remote position in the town. A. N. P."

DESIGN FOR ST. BRIDE'S FOUNDATION INSTITUTE.

This was a competition design sent in by its author, Mr. T. Garratt, for the proposed building above named. The front was intended to be executed in Portland stone and red brick, the ground story to Bride-lane being entirely of stone.

The drawing was exhibited at the last Royal Academy Exhibition.

DESIGN FOR A TOWN-HOUSE.

This design was awarded the Medal of the Architectural Association this year.

The conditions laid down the width of frontage, but the depth of the building was not stringently defined; the site being assumed to measure 150 ft., out of which a portion would be used as garden. A billiard-room, dining-room, drawing-room, and morning-room were required on the two chief floors—a certain number of bed-rooms, &c., on the other floors, and the usual basement offices. With these data no special difficulty presented itself, and the planning resolved itself into the problem of obtaining a certain dignity and convenience on the two principal floors, and comfort and usefulness in the remainder of the house.

The temptation to make sacrifices in order to obtain a top-light for the billiard-table has been avoided. A billiard room in a town house is not in so much request as in a country house, especially during the daytime, and even then the circular hay window would afford a good light.

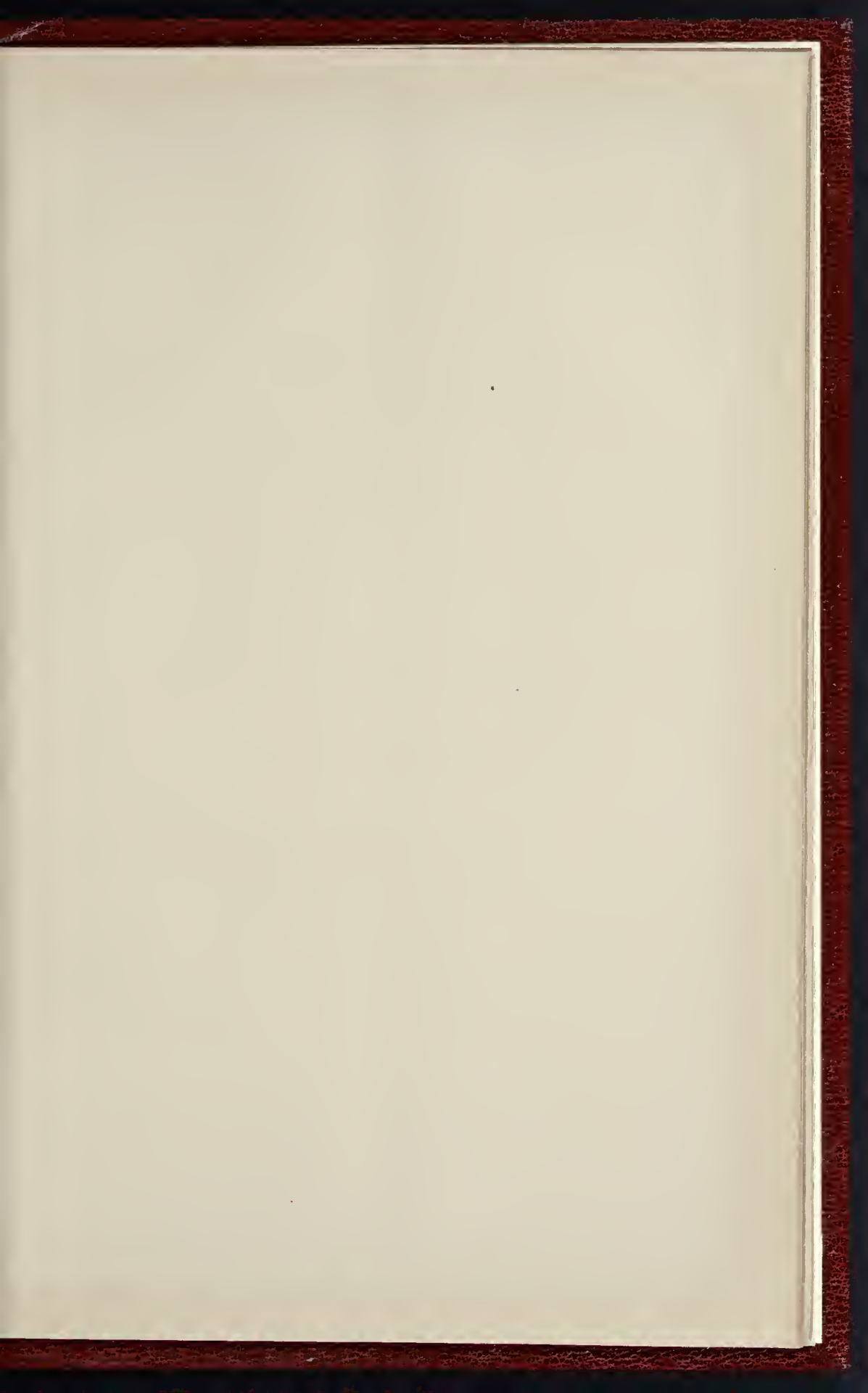
Although the conditions were somewhat ambiguous on the point, the author considered that they did not allow of structural projections. A flat treatment has, therefore, been adopted, introducing deeply-recessed windows in the drawing-room, with a central window on the same plane as those on the ground floor. A deep shadow would thus result under the first-floor arches, and internally the piers supporting them would form a not unpleasant feature in the morning-room.

The materials, in the author's idea, would be Portland stone and red bricks, with a tiled roof.

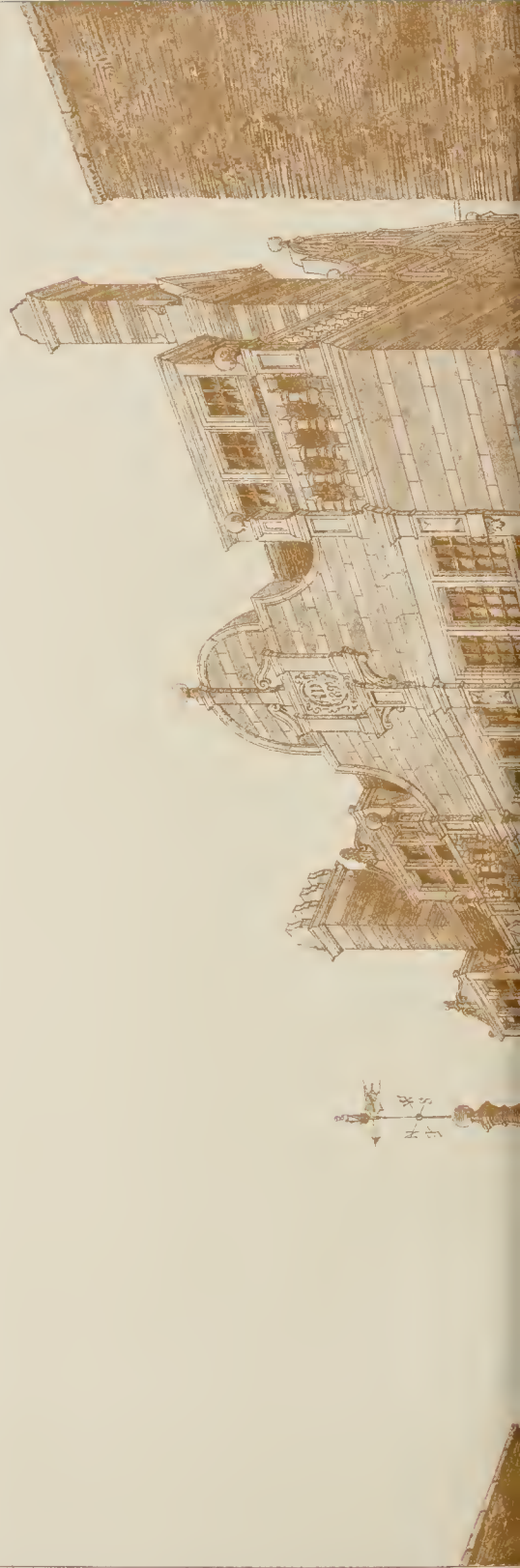
A. H. C.

"ELM-HURST," HANTS.

A HOUSE, or rather a combination of three small houses, has existed upon this site for many years, and in rebuilding, a portion of a dwelling-house in concrete, built some twenty-five years ago, has been incorporated with the new building. The block on the right, with the angle turret and the hay window surmounted by an oversailing gable, is the end of the old portion, to which the new wing has been tacked on at an angle of nearly 45 deg., an arrangement made with the desire to get a full southern aspect and the advantage of a beautiful view. The ground floor rooms in the new wing, (commencing from the junction



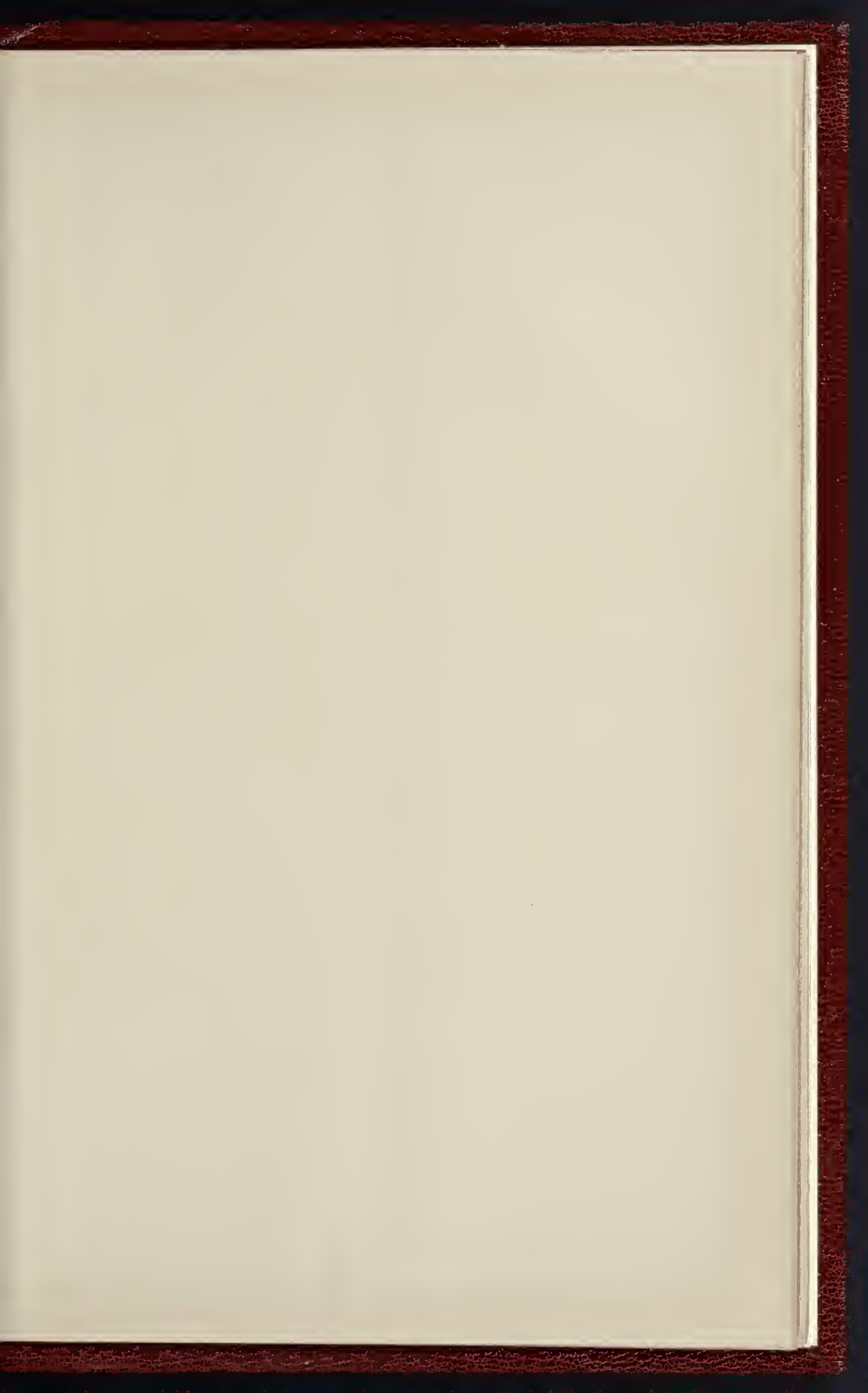
· DESIGN · FOR · ST BRIDE ·
· FOUNDATION · INSTITUTE ·
· View ·
· from · Churchyard ·
by MR T. GARRATT, A.R.I.B.A



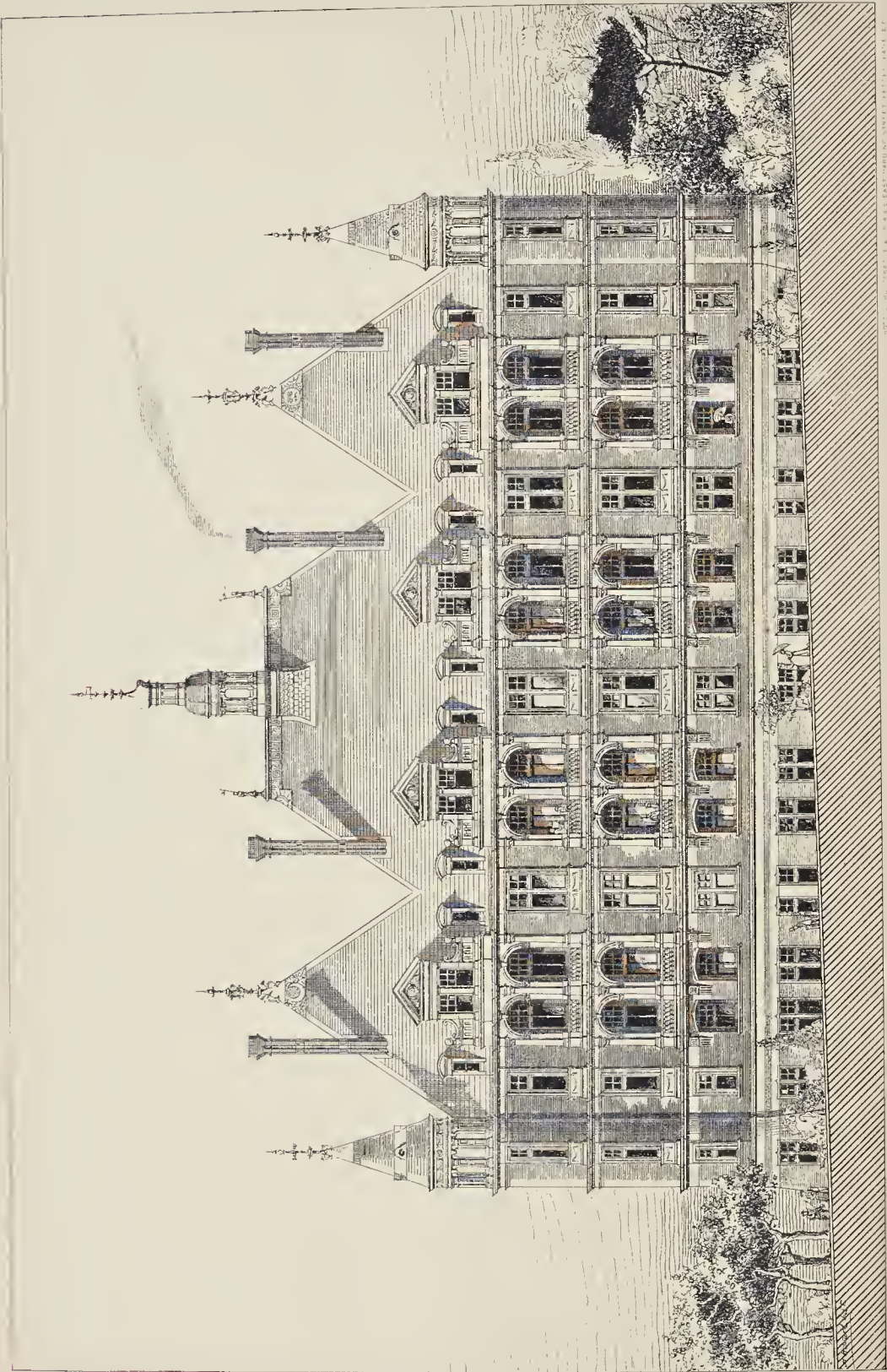


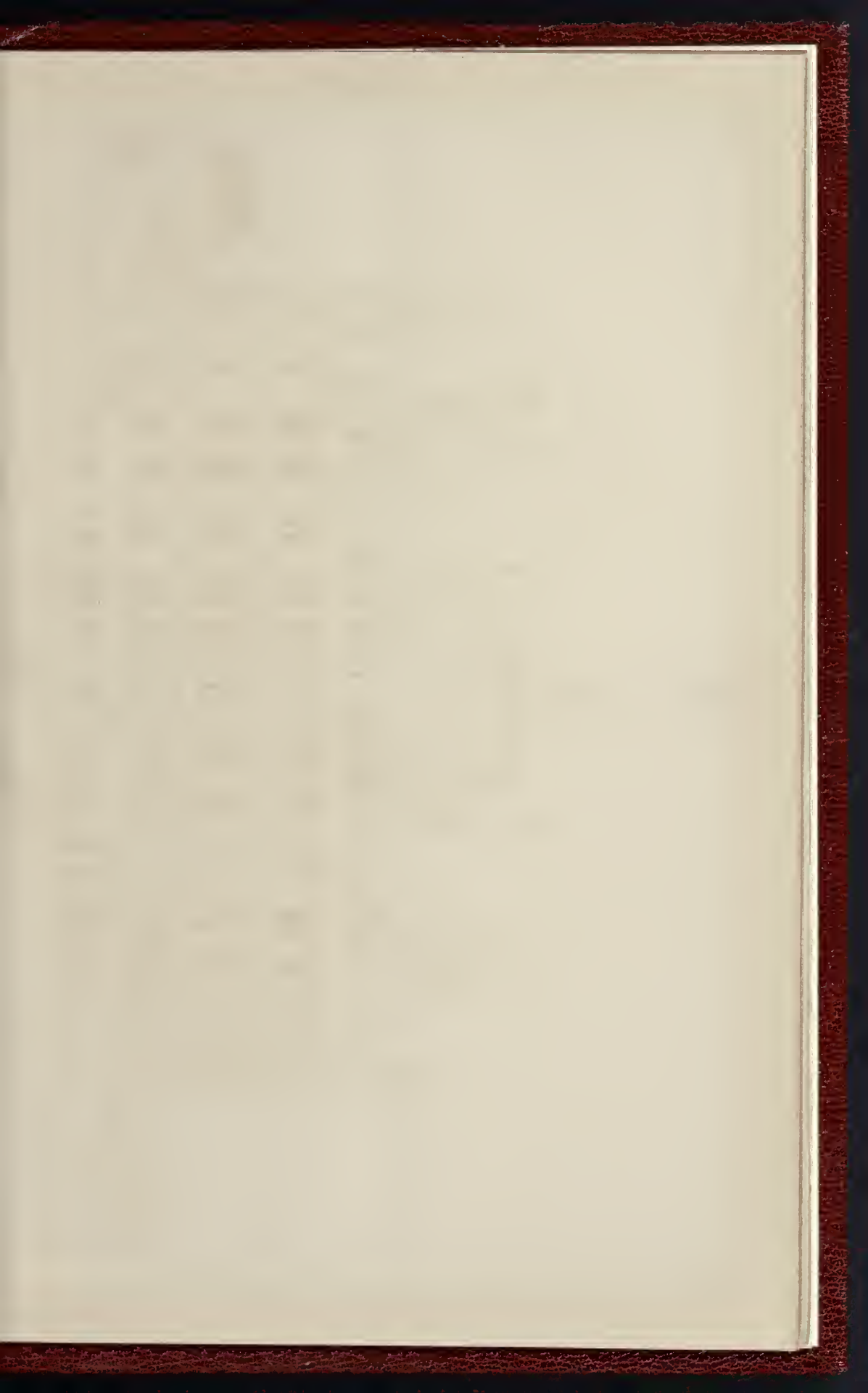
THE PHOTO ENGRAVED BY E. C. 485 EAST ABERDEEN ST. LONDON, W. 1892.

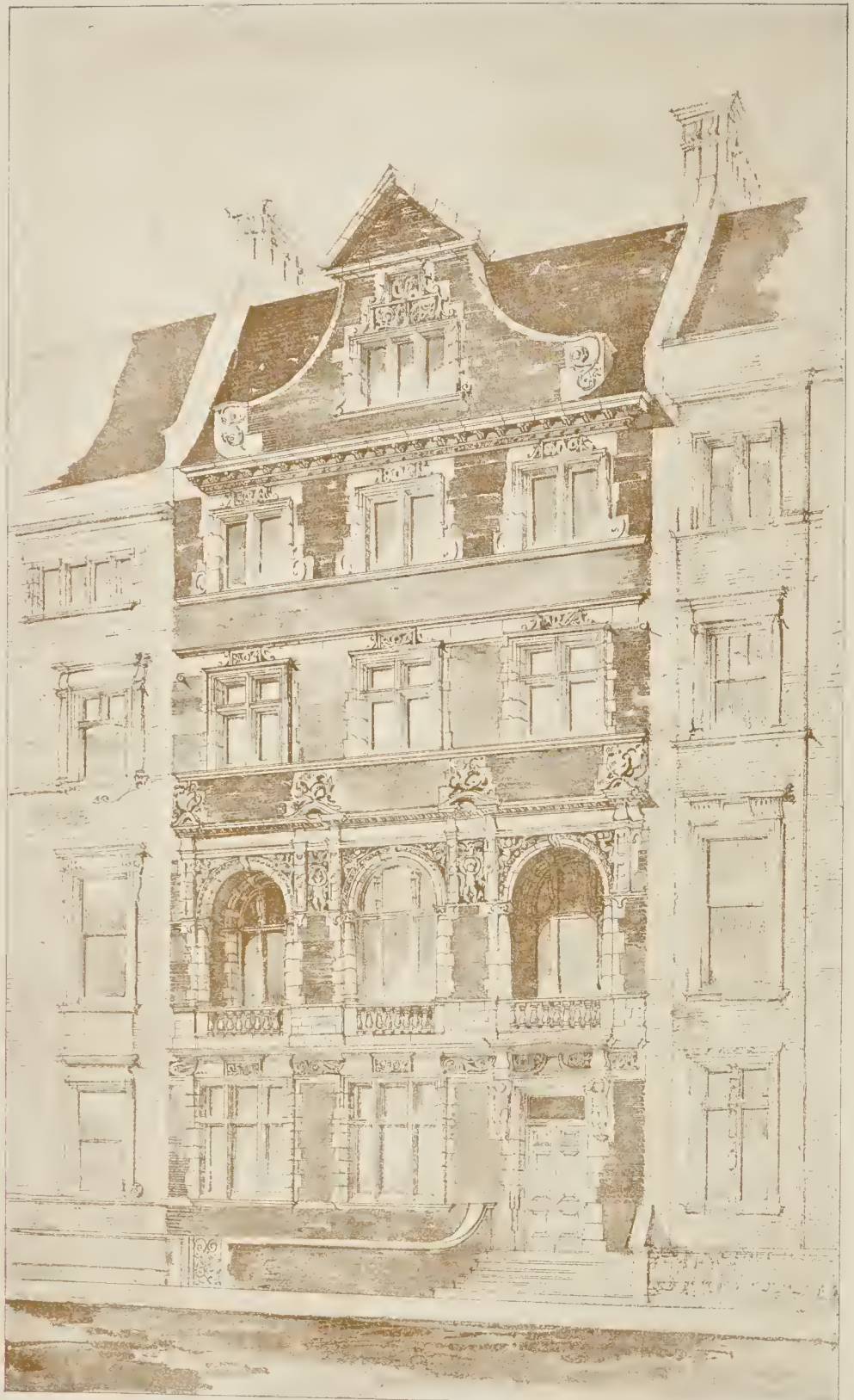
Royal Academy Exhibition, 1892



THE BUILDER, DECEMBER 31, 1892.







INK PLOT. PHOTOGRAPHED BY J. & F. S. EAST, HARLING STREET, PETTER LANE, E.C.

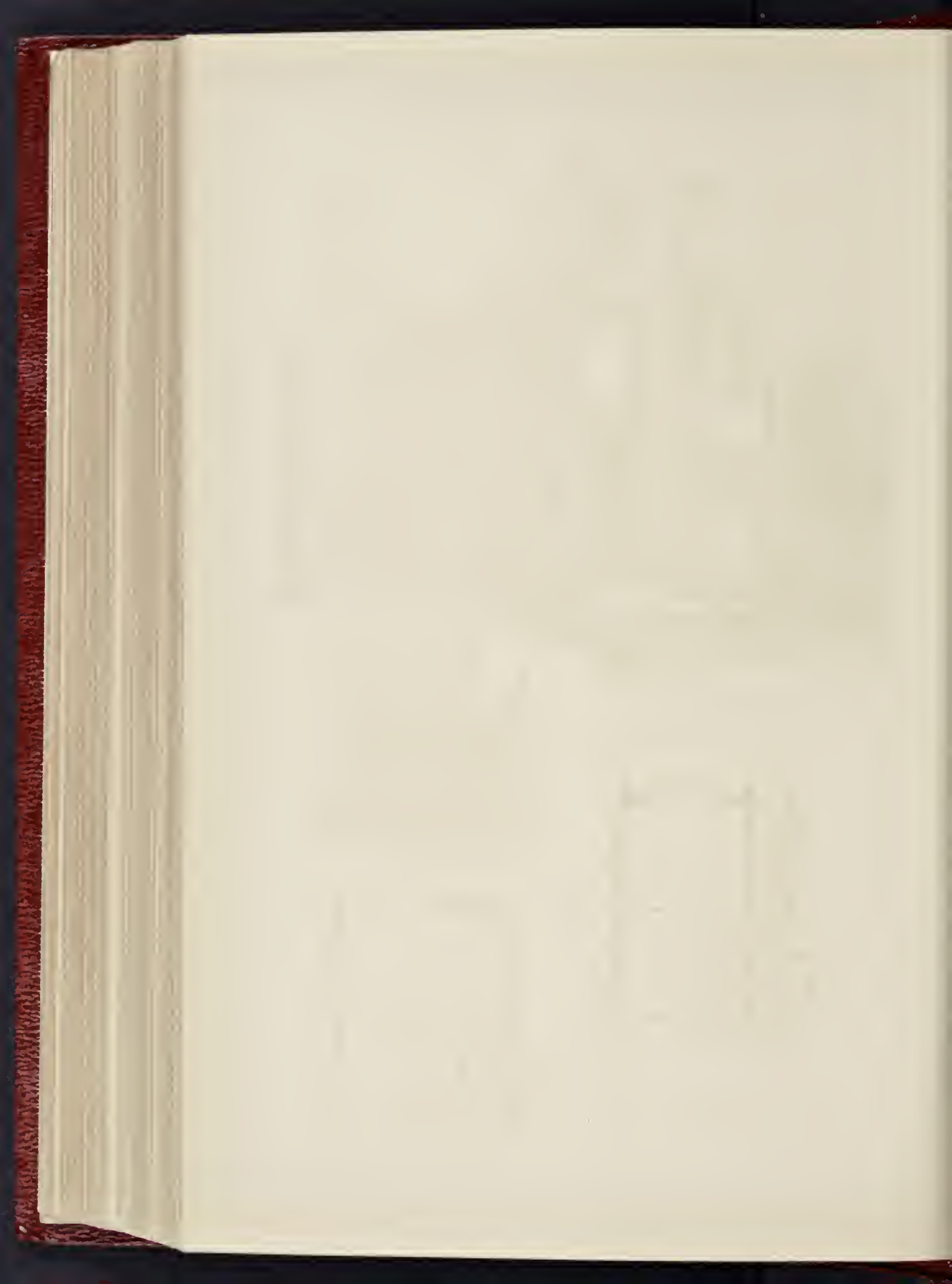
Architectural Association Medal

DESIGN FOR A TOWN HOUSE—BY MR. A. H. CLARK, A.R.I.B.A.



ELMHURST, HANTS.—MR. E. PROLEAU WARREN, ARCHITECT

ELMHURST, HANTS.—MR. E. PROLEAU WARREN, ARCHITECT

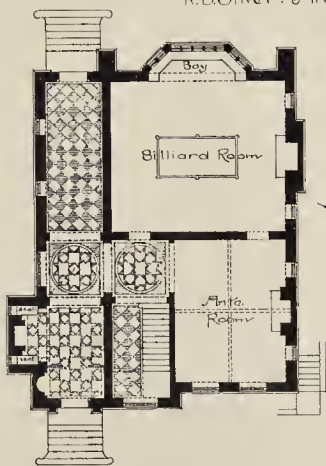




House and Studio:
Holland Park, W.
W. Graham Robertson Esq.
R. D. Oliver: Archt.

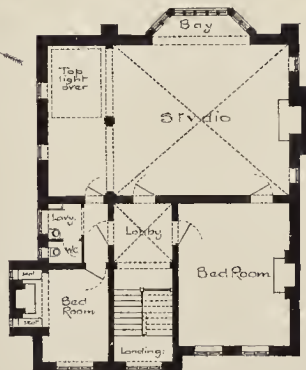


South-West Elevation



Ground Plan:

Scale of feet.



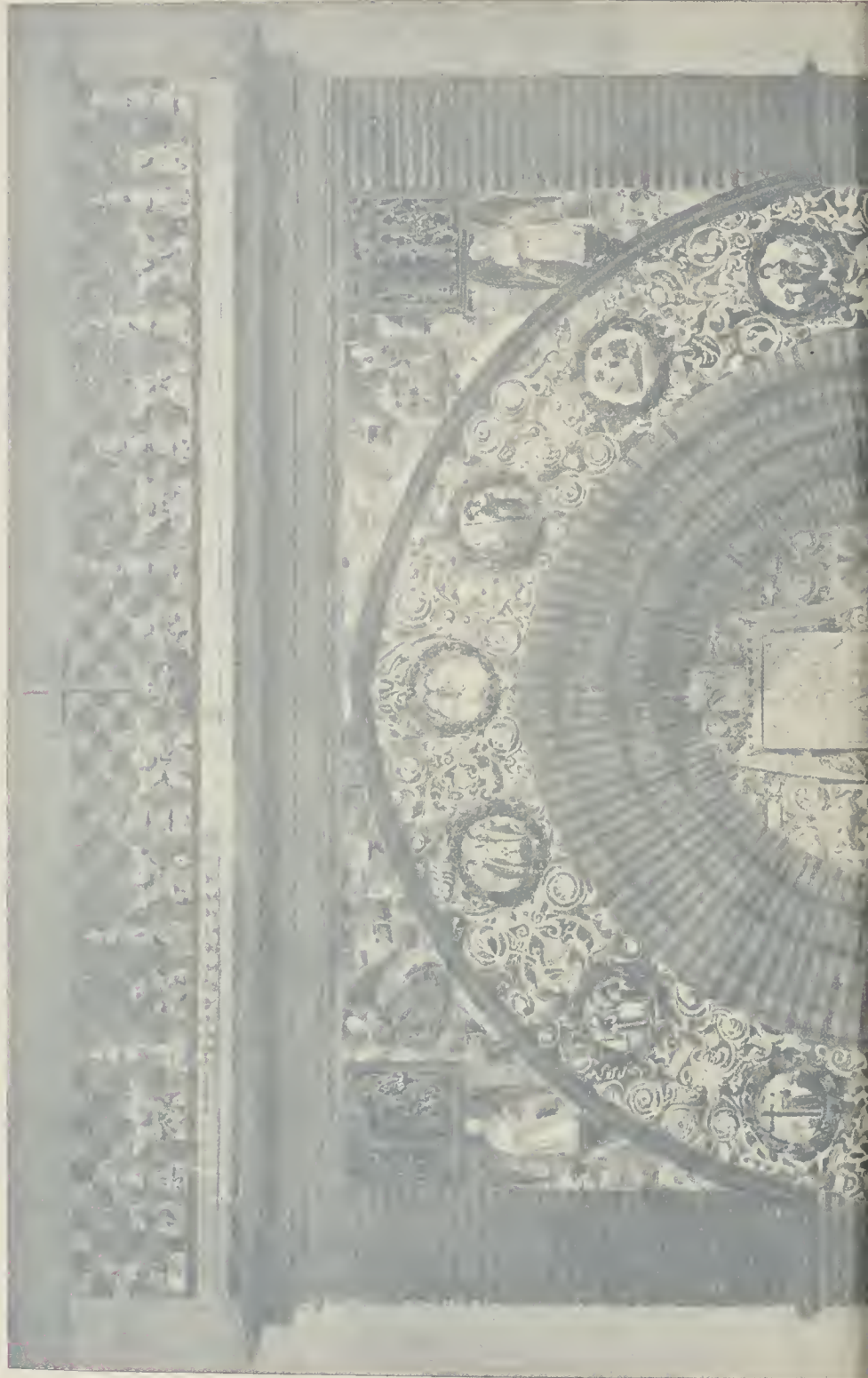
Upper Plan:

R. D. Oliver
Arch.

PHOTO-LITHO. SPRAGUE & CO. 4 & 5 EAST HARDING STREET FETTER, LANE E.C.



THE BUILDER, DECEMBER 31, 1892





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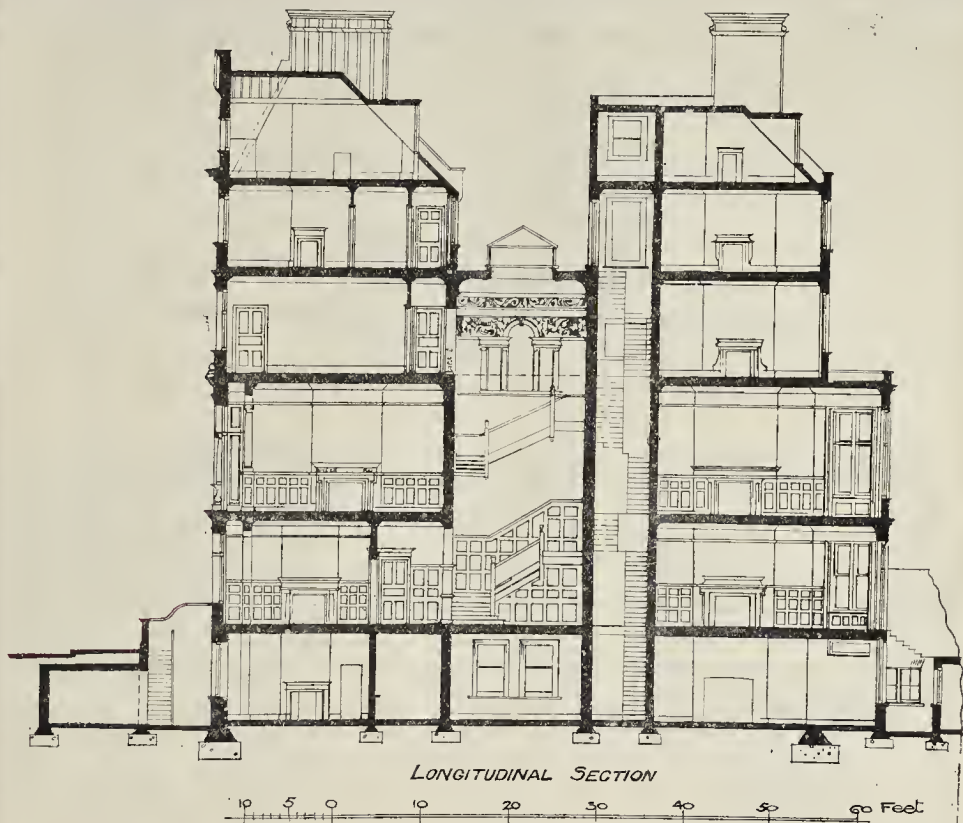
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NO. 1. 1850. 1851. 1852. 1853. 1854. 1855. 1856. 1857. 1858. 1859. 1860. 1861. 1862. 1863. 1864. 1865. 1866. 1867. 1868. 1869. 1870. 1871. 1872. 1873. 1874. 1875. 1876. 1877. 1878. 1879. 1880. 1881. 1882. 1883. 1884. 1885. 1886. 1887. 1888. 1889. 1890. 1891. 1892. 1893. 1894. 1895. 1896. 1897. 1898. 1899. 1900. 1901. 1902. 1903. 1904. 1905. 1906. 1907. 1908. 1909. 1910.



Design for a Town House.

angle outwards) are drawing, library and billiard room, the latter one story only.

The site is not far from Christchurch Hants. The new work is in brick, the upper story tiled. The builders are Messrs. Holloway Bros. of Battersea, and the architect Mr. E. Prioleau Warren.

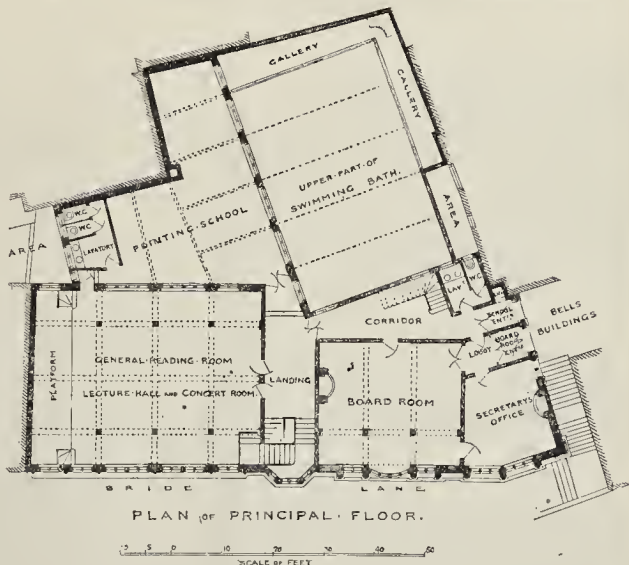
HAMPSTEAD HOSPITAL.

THE North London Hospital for Consumption, Mount Vernon, Hampstead, which we illustrate this week with an elevation of the garden or south front, and plans of the ground-floor and one of the ward floors, was commenced in 1880 from designs by Professor Roger Smith, which were accepted by the Committee as the result of a competition. The western block was then built, and has been in constant use since, but necessarily at a considerable amount of inconvenience, as the administrative portions were then for the greater part omitted.

The central block is now in course of erection, and will provide accommodation for over thirty additional patients, partly in new wards, and partly by setting free some small wards at present used for other purposes, and it will, in addition, give nearly all the administrative accommodation that will be required for the hospital when completed.

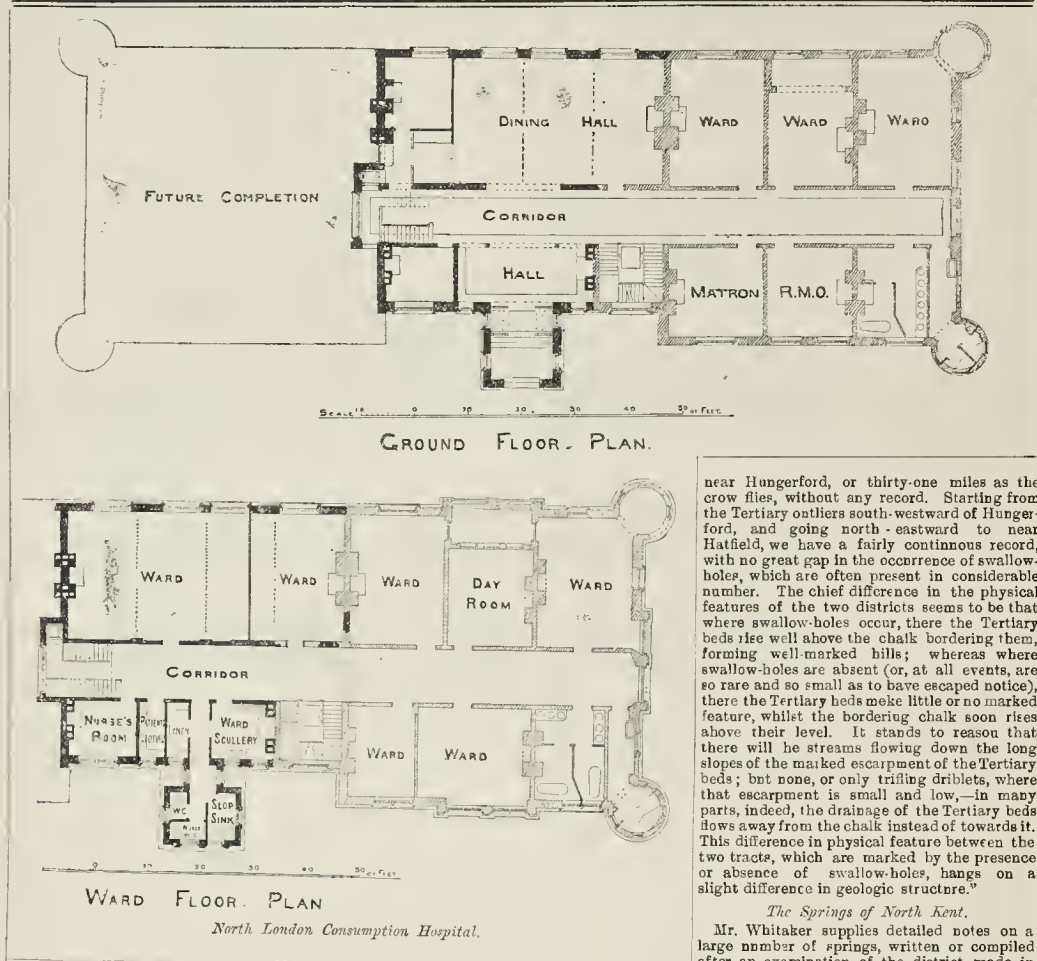
There is a basement-floor to the building, as far as it is at present to be carried, with a separate entrance, and it contains the chapel, dispensary, out-patients' department, &c.; a ground-floor, as illustrated; two ward floors, one for men and one for women, the wards and day-rooms having in nearly every case a southern aspect; and an attic-floor devoted to kitchens and the necessary accommodation for servants and nurses.

The work at present in hand includes some alterations to the older portion, as some tem-



Competition Design for St. Bride's Foundation Institute.

porary arrangements had to be made when it stood by itself; its design is in some few respects modified from the elevation shown. The materials used are red bricks, with Bath-stone dressings and Broseley tiles. The building of this portion, which is nearly



roofed in, and will be completed in the course of the spring, is being carried out by Messrs. L. H. & R. Roberts. Messrs. Waygood & Co. have erected a new hydraulic passenger-lift in the well-hole of the old staircase, and Messrs. Rosser & Russell have partly renewed and extended the heating apparatus, and are providing new hot-water service throughout the whole building.

The elevation drawing which we publish was exhibited at the Royal Academy this year, and we give it, as described in the Academy catalogue, as by "Messrs. Roger Smith, Son, & Gale." As our readers are aware, the style of the firm is now altered to "Roger Smith & Son."

A HOUSE AND STUDIO.

This very practical looking sheet of drawings was exhibited at the last Royal Academy Exhibition. Though the architectural treatment is simple, there is a good deal of character in the manner in which the house and the studio portion are grouped and distinguished in the design. The architect is Mr. R. D. Oliver.*

OUR JUBILEE NUMBER: NOTICE TO CORRESPONDENTS.—As it will be necessary for us to go to press a few hours earlier than usual next week, we must ask our correspondents to send all communications for the Editor so as to reach us before 6 p.m. on Wednesday.

* We are unable to give further details as to the building, owing to the architect having changed his residence since the date of the R.A. Exhibition, and we have not been able to discover his present address. We shall be glad if Mr. Oliver will communicate with us, as a copy of the *Builder* Album is waiting for him, when we know where to send it.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

Continued from page 519.

The swallow-holes at or near the junction of the Tertiary beds and the Chalk act in all seasons, whenever there is a flow of water to them. Outside the Basin of the Thames, but still in the London Basin, some notable occurrences of a like sort to those above-mentioned may be alluded to.—The Little Stonor, in dry seasons, below the village of Bridge and rising again between Bettesbourne and Littlebourne (or more than a mile lower down its course). This is a like case to that of the Mole. Westward of Canterbury: there are swallow-holes along the boundary of the Tertiary beds here, chiefly around Ensigne, where some of them are large and have been described by Professor Prestwich (*Quart. Journ. Geol. Soc.*, vol. xl, 1855). There are also some round the border of the Selling Outlier. It should be noted that these swallow-holes are near the boundary of the Thanet Beds, which there come in between the Reading Beds and the Chalk; but in East Kent this formation does not consist merely of sand, as in West Kent, being largely composed of clayey beds; so that for the most part it does not allow water to percolate through to the Chalk. It is classed among the Mixed Beds of my Chalk Area Map. On the south there are two great gaps in the records,—so great, indeed, that they much exceed the small areas of occurrence. The first of these gaps is from the Headley Outlier westward to Fainham Park, a distance of about twenty-two miles, as the crow flies. We then meet with swallow-holes for some three miles, and then go westward, from near Crondall to

near Hungerford, or thirty-one miles as the crow flies, without any record. Starting from the Tertiary outliers south-westward of Hungerford, and going north-eastward to near Hatfield, we have a fairly continuous record, with no great gap in the occurrence of swallow-holes, which are often present in considerable number. The chief difference in the physical features of the two districts seems to be that where swallow-holes occur, there the Tertiary beds rise well above the chalk bordering them, forming well-marked hills; whereas where swallow-holes are absent (or, at all events, are so rare and so small as to have escaped notice), there the Tertiary beds make little or no marked feature, whilst the bordering chalk soon rises above their level. It stands to reason that there will be streams flowing down the long slopes of the marked escarpment of the Tertiary beds; but none, or only trifling dribbles, where that escarpment is small and low,—in many parts, indeed, the drainage of the Tertiary beds flows away from the chalk instead of towards it. This difference in physical feature between the two tracts, which are marked by the presence or absence of swallow-holes, hangs on a slight difference in geologic structure."

The Springs of North Kent.

Mr. Whitaker supplies detailed notes on a large number of springs, written or compiled after an examination of the district, made in November and December, with Mr. Topley, and for the most part with Mr. Easton.

The springs between Dover and St. Margaret's were well seen. In places they were bubbling up in a marked way, whilst in others there was a more gradual outflow. The total yield must be very great, and it simply runs to waste. He describes the Dour and springs or brooks from Mongebam to Eastry, at Wingham, Bonghton, Goodneston, Faversham, Luddenham, Teynham, Papchild, Sittighourne, Newington, Rainham, Boxley and Aylesford (which supply Maidstone Waterworks), in the valley of the Medway, in the Hundreds of Hoo, at Higham, Gravesend, Northfleet, from Erith to Woolwich and Greenwich, in South Essex, between the Darent and the Medway, between the Medway and the Stour, and eastward of the Stour. Speaking of the last-named district, he says that here the outcrop of the chalk gets broader than elsewhere in Kent, and it is exceptionally bare of surface deposits. It is, therefore, well arranged for the absorption of much water. The water-works in the district are—for Canterbury, in the valley of the Stour; for Wingham, which is supplied from one of the springs in the valley; for Deal, by works at Walmer; and for Dover. Folkestone, too, gets its supply from a chalk spring, but it is one at the foot of the escarpment. Besides these works, not one of which is large, there is little demand for the water, the district being an agricultural one. Mr. Whitaker says:—

"It seems clear, therefore, that a very large amount of water can be got in this district, and mostly of water that runs to waste, soon passing into tidal streams or direct into the sea along the base of the cliffs. Part of this tract seems, indeed, to be highly favourable for the percolation of rain into the chalk, on account of the great amount of practically bare chalk, as well as from the fact that the comparatively small areas of surface deposits consist of beds that are, as a rule, far from impermeable. Proof of large percolation seems to be given by the volume of the springs that flow out into

the sea along the coast, north-eastward of Dover, the tract from which their waters is derived being a limited one. As in the case of the other districts, water in large quantity could best be got by long tunnels in the lower grounds at the northern part of the outcrop of the chalk, with shafts at various places. These tunnels would run more or less east and west; but most likely a southerly branch would have to be made to secure the springs along the coast.

In the Isle of Thanet the towns of Ramsgate and Margate both have waterworks with a great length of galleries, and Broadstairs and Westgate have smaller works of the same sort. As there is great addition to the population of these towns in the season when there is least water, Mr. Whitaker and his colleagues came to the conclusion to disregard Thanet for the purposes of this inquiry. The western part of this district is, however, as yet untouched. To sum up, Mr. Whitaker concludes:—

"From previous knowledge of Kent, obtained during residence in various parts of the county, and from visits lately made, I have no doubt but that a very large amount of water could be got from the Chalk there, and might be so taken as not to interfere seriously with any streams of importance. Wherever any damage might result to existing interests, this could easily be met by construction of some sort. This water would form a large supplementary supply for London, and a smaller one could be got from the Lower Greensand."

The Chalk Areas of Kent.

Mr. Topley, in his statement, says that, in accordance with the request of the Commission, he has made a special inquiry into the probable resources for water supply of the Chalk areas in East Kent, with a great part of which he had a personal acquaintance in the course of the Geological Survey of the district. He has again visited the district in company with Mr. Whitaker and Mr. Easton. Mr. Whitaker was also well acquainted with the country, having made the geological survey of the greater part of it. Mr. Topley deals successively with the shape of the ground, superficial beds over the chalk, rainfall and percolation, underground water, springs along the coast under the Chalk escarpment, and on the northern slope of the Chalk; millbourne valleys; well measurements; Chalk areas, methods for obtaining water, and estimates of the quantity now utilised. Mr. Topley mentions that much useful information has been received from Mr. R. D. Batchelor, of Chatham, who has made a large number of wells and deep borings in the district. Information has also been obtained from waterworks, cement works, &c., concerning their supplies.

The following is a table of the Chalk areas of Kent east of the Kent Water Company's District, all the figures indicating square miles:—

Chalk area.	Chalk covered with	Outliers, spurs, and Saper-edges of Total	Total	
		tertiary Chalk beds.	Chalk area.	
A. Between the basins of the Darent and Medway.....	28	11	10	49
B. Medway basin, west of the river.....	19	7	3	29
C. Medway basin, east of the river.....	35	15	3	56
D. Swale basin.....	27	49	10	86
E. Stour basin.....	125	68	5	198
D. Between the basins of the Stour and Dour.....	20	3	—	23
F. Dour basin.....	14	14	—	28
G. Chalk areas north-east of Thanet.....	21	2	—	23
	389	170	31	490

The following is a joint estimate of the quantity of water now utilised:—

	Galls. per day.
Medway and Swale:—	
Higham and Hundred of Ico Waterworks (in progress).....	250,000
Strood Waterworks.....	560,000
Rochester Waterworks.....	1,250,000
Sittingbourne Waterworks.....	250,000
Faversham Waterworks.....	250,000
Malden Waterworks (Chalk water).....	600,000
Mid-Kent Waterworks (Lower Greensand water).....	250,000
Stour:—	
Canterbury.....	750,000
East-Kent Waterworks (in progress).....	250,000
Deal Waterworks.....	250,000
Dover Waterworks.....	1,000,000
Folkestone Waterworks (Chalk water).....	500,000
	6,100,000

Private wells, cement works, paper mills, &c. (mainly in the Medway Valley); water chiefly from the Chalk, but some from the Lower Greensand..... 7,900,000
14,000,000

We reserve further notice of the statements and evidence.

COMPETITIONS.

BOURNEMOUTH PAVILION.—The authors of the designs numbered 5, 6, 11, 13, 14, and 15, in the first competition for this work, have been invited to send in final designs to a scale of 8 ft. to an inch; too large a scale for competition drawings, and may be observed. The limit of cost has been raised to 16,000*l.* Each of the six competitors is to receive a fee of 50*l.*, and in the event of the successful competitor not receiving instructions to proceed within twelve months after the date of selection he is to receive such reasonable compensation (in addition to his fee of 50*l.*) as shall be agreed to by the committee. The drawings are to be sent in on March 1. Mr. Charles Barry is the professional assessor.

CHRIST'S HOSPITAL.—About 150 applications have been received for selection to enter this competition. Some eminent architects of the day have applied, but a large proportion of the applications are from architects little known to fame. It is not expected that the Council's decision will be announced much before the end of January.

ARCHITECTURAL SOCIETIES.

NORTHERN ARCHITECTURAL ASSOCIATION.—At the last meeting of this Association, held on the 21st inst. in the meeting-room, Art Gallery, Newcastle-on-Tyne, presided over by the President, Mr. J. H. Morton, of South Shields, Dr. E. H. Gibbon delivered a most instructive and entertaining lecture on "Pompeii, Past and Present." The lecture was well illustrated by means of linealight illustrations. A hearty vote of thanks to Dr. Gibbon was proposed by Mr. Joseph Oswald, seconded by Mr. Frank W. Rich, and carried by acclamation.

DUNDEE INSTITUTE OF ARCHITECTURE, SCIENCE, AND ART.—The next meeting of this Institute will be held on Monday, January 5, when a paper will be read by Mr. A. H. Miller, F.S.A.Scot., on "Curiosities of Architecture in Duodec."

Correspondence.

To the Editor of THE BUILDER.

ANTHRACITE COAL.

SIR,—With regard to the important question of supply which you raised in your article of December 10, I have caused inquiries to be made in various directions, for this matter is being thoroughly gone into. The following are the results, stated as briefly as possible:—

Mr. Robson, H.M. Inspector of Mines for South Wales, writes under date December 15 that the shipments in 1888 were 906,258 tons; in 1890, 1,220,916 tons; and in 1891, 1,238,161 tons. Those of 1889 were not tabulated separately.

Mr. Law, Superintendent, Swansea Harbour, says the shipments of anthracite for San Francisco (?) at his port are "largely increasing," being 26,037 tons in 1890, and 74,846 tons in 1891.

Mr. F. Cleaves, of the Gwan-cae-Gurwen Colliery Company (the largest in Glamorganshire), says their shipments in 1889 were 93,315 tons (the year ending September 30), and in 1892, 122,986 tons; the estimated output for the whole of 1892 being 250,000 tons, which might in a short time be doubled.

Mr. Kydd, of the Great Mountain Company (the largest in Carmarthenshire), gives the shipments for 1889 as 62,066 tons, and the estimate for 1892 as 95,000 tons,—all of the purest description, none being sold for lime-burning or similar purposes. He adds that they could produce 2,500 tons a day.

Finally, Mr. W. Gwynne, mining engineer, of Cardiff, has traced the anthracite coalfield of South Wales to show an area of no less than 240 square miles, with an aggregate thickness of 30 ft.

I venture to think, Sir, that this accumulation of evidence disposes of all doubt as to supply, and of all fear as to prohibitive prices. I must confess that these results exceed my own anticipations, although I had every reason to believe that there was a very large deposit of the mineral, such being the common impression, at any rate west of Cardiff.

R. S. RICHARDS.
(London Manager of the Gwan-cae-Gurwen Colliery Co.)

December 27.

"BENNETT'S HYDRAULIC SELF-CLEANSING STREET GULLIES."

SIR,—The diagram which you published in your issue of the 17th inst. under the above heading is but a preliminary representation, and a mere unit

of an improved system for the more efficiently cleansing street gullies and carriageways, which for many years I have been formulating and perfecting, and in connexion with which I have five independent inventions.

The inference to be drawn from Mr. W. B. Powell's statement in his letter, in your issue of the 24th inst. that we are in Southampton making and installing hydraulic gullies invented by him. This is entirely erroneous, and is an injustice to my system. What we are doing is correctly stated in your columns of the 17th, viz.—"At Southampton one of these gullies is operated by compressed air. In that town three miles of air main are laid in the streets in connexion with the Shone system of sewage, from which service connexions can easily be laid on, the waste heat from the combustion of the house refuse in a destructor being utilised as the motor required for compressing the air. By this arrangement the frequent emptying of the gullies, often much neglected, is much facilitated."

This is entirely a different thing to Mr. Powell's conception.

I may, however, add that my inventions are of such a nature that whenever I find it more convenient to work this system hydraulically I shall do so; but at the same time, being desirous only of obtaining improved sanitation, I shall welcome any legitimate improvement from Mr. Powell, or any one else.

W. B. G. BENNETT.

The Student's Column.

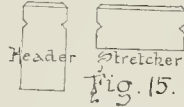
CONCRETE.—XXVII.

WALLS (continued): EXTERNAL TREATMENT.

SOMETIMES concrete walls are faced with a superior kind of concrete, deposited at the same time as the hearting or backing of the wall. This method is seldom or never applied to the walls of build-ings, but is frequently adopted for large retaining walls, dock walls, breakwaters, &c. We do not see, however, why it should not be used for the external walls of buildings. The originator of the system was Mr. Thomas Dyke, who in 1869 commenced the extension of the break-water at Hartlepool with common concrete hearting and superior facing. The latter consisted of 1 part Portland cement and 4 parts whinstone, broken in a Blake's crusher to $\frac{1}{2}$ -in. gauge. The face of the wall was outlined with standards and shutters, and within these, at distances of 9 in. and 18 in. in the alternate layers, internal partition-boards were placed and kept in position by distance pieces extending from them to the shutters. The common concrete was deposited and rammed within the internal partition-boards, while immediately afterwards the face-concrete was deposited and rammed between the partition-boards and the shutters. The partition-boards were then withdrawn, and the two concretes were united by ramming along the line of junction. Each layer of concrete was 9 in. thick.

In 1874 Mr. Bernays adopted the same plan at Chatham, using a 1 to 12 concrete for the hearting or backing, and a 1 to 6 for the facing; the latter consisted of 1 part Portland cement, 2 parts sand, and 4 parts iron-furnace slag broken in a Blake's crusher to about $\frac{1}{4}$ -in. cubes. The appearance of the walls is, says Mr. Bernays, far from unpleasing either in texture or colour, the surface being "invariably left with all imperfections, as it appears on the removal of the shuttering." Mr. Bernays has also used facing-concrete (without plaster) for the walls of water-tanks, pump wells, &c., and for the exposed surfaces of coping, steps, kerbs, paving, and hutting-blocks. The coping, which had a cross-section of 4 ft. x 2 ft., consisted of 1 part Portland cement and 8 parts gravel, faced on the top and two sides with a 2-in. coat of cement and broken granite (1 to 2). The building-blocks, which measured 18 in. x 9 in. x 6 in., were composed of cement and gravel (1 to 10), faced 1 in. thick with cement and fine gravel (1 to 4). The surface of the coping, kerbs, &c., is much improved by being dressed with a diamond-pointed hammer; "it is then difficult to distinguish the concrete from real granite." In all cases of facing, the two kinds of concrete should be put in as nearly as possible simultaneously, in order that they may set into one mass. Heavy concrete walls are sometimes faced with brickwork or masonry, or with concrete blocks. In engineering works, concrete blocks of enormous size are sometimes used, and, employed in this way in the sea, they

have several advantages over concrete deposited *in situ*. But for buildings, concrete blocks must necessarily be small, and they are therefore very expensive when compared with monolithic concrete. For facing the walls of promenades and sea-walls, concrete blocks of moderate size are often employed, as these have a better appearance than the plain surface of concrete as left by the shunters. The joints between the blocks also allow for expansion and contraction, and so prevent cracks from disfiguring the walls. Blocks have the further advantage that, as they are kept some time before being placed in position, any defective concrete is discovered



during that time. Fig. 15 shows the concrete blocks used in the face of the Scarborough sea-wall.* The blocks measure about 24 in. x 12 in. x 12 in., and have triangular grooves in their ends, and a chamfer 1½ in. wide around the face of each; they were made of 1 part Portland cement, 2 parts sand, and 4 parts shingle, faced at the same time 2 in. thick with 1 part cement and 2 parts shingle, passed through a ½ in. sieve and having all fine sand removed. They were kept one month before being placed in the wall, and were then set, in alternate courses of headers and stretchers, in Portland cement mortar (1 to 2); the joints were well grouted, and in this way the blocks were doweled together by means of the triangular grooves.

Many patents have been taken out for concrete building-blocks of various kinds, Z-shaped, hollow, &c., but they are not often used. Concrete is, however, largely used in the form of steps, millions, beads, sills, jambs, &c., but chiefly under the name of artificial stone. A quite bewildering number of patents for artificial stone have been taken out, but few of them have been successful or profitable. We may just mention the artificial stone of Messrs. W. H. Lascelles & Co., known as "Lascelles' Concrete," which has been used by many eminent architects, including Mr. Waterhouse, Mr. Christian, and Sir A. W. Blomfield. It is made in three colours—red, buff, and grey.—and can be obtained in the form of balustrades, cornices, pilasters, copings, sills, beads, columns, pilasters, finials, &c.† Into Mr. Lascelles' system of building by means of wood framework and concrete tiles we cannot enter here.

Messrs. F. Rosher & Co. issue a large catalogue containing many excellent examples of their artificial stonework, in the form of balustrades and other architectural features, fontains, statues, vases, &c. Messrs. Fambirini & Daniel, of Lincoln, make an "imperishable red concrete," and mould it into a large variety of architectural features, such as cornices, strings, modelled panels. The manufacture of artificial stone, however, although it is invariably a kind of concrete, and most frequently a Portland cement concrete, cannot be considered here. The student is referred for further information on the subject to the series of articles which appeared in the "Students' Column" of the *Builder* from July to December, 1888.

Some of the forms of artificial stone, such as modelled panels, balustrades, coping, &c., furnish a ready means of decorating concrete buildings. So also do tiles of various kinds, plain or ornamental, glazed or unglazed; modelled and moulded panels of terra-cotta can also be conveniently inserted. Prof. Aitchison mentions a palace in Berlin which is faced with unglazed paving tiles, and has window-dressings of majolica, and a frieze of glass-mosaic. Sgraffito work was tried at South Kensington. The wall was covered with Portland cement coloured black, and on this a thin coat of Portland cement stucco was laid, in which the design was scratched. After some years, moisture got between the two coats, and the outer one peeled off. Sgraffito has, however, been successfully employed in other buildings, especially in small panels, pediments, &c.

Most frequently, the concrete walls of buildings are finished with some kind of stucco or rough-cast. Mr. Potter recommends for common

work the system of "rough-trowelling." When the concrete has thoroughly set, a stiff mortar of Portland cement and clean sharp sand (about 1 to 3) is applied with a plasterer's handfloat, and "is thoroughly worked into the crevices of the concrete, but leaving no body or coat on the surface." After being smoothed with water and a distemper-brush, the work is complete.

A proper coat of Portland cement and clean sharp sand (1 to 2 or 1 to 3) is most frequently employed for the external faces of concrete walls. The surface of this stucco can be finished in the different ways; if a wood float, or a float covered with felt, be used, the sand is brought to the surface, and a rough texture is the result; if a steel float or trowel be used, an exceedingly smooth surface can be obtained; if after floating with the steel trowel the surface be finished by dabbing the trowel on it, a medium texture is obtained. The stucco can be ornamented by impressed designs, by raised stencilled patterns, and in other ways.

When rough-cast and "rough-trowelling" are adopted, the angles of the buildings and of all voids may well be finished with bands of cement a few inches wide, and ½ in. or ¾ in. thick.

Attempts have been made to give variety to stucco by mixing different colouring matters with the dry material, but in all such attempts there is a danger of the setting properties of the cement being injured, and the further disadvantage that the stucco may prove very uneven in colour. Considerable variety could safely be given by the use of different coloured sands; but where these are not available other substances would have to be tried. Mr. Rowland Plumbe says that a dark red colour can be obtained by the use of purple-brown (oxide of iron), light red by Venetian red, blue by German ultramarine, and black by black manganese; the proportion he recommends is 1 cement, 2 of sand, and one-tenth colouring matter.

Colour effect can also be obtained by means of good washable distemper, or, of course, by painting, but the expense of continual colouring and painting would be a drawback to the use of concrete and stucco.

ROOFS.

Flat roofs have several advantages, and can conveniently be constructed of concrete with iron or steel girders at intervals. If the underside of the concrete has to be the ceiling of the room below, it may be desirable that it should be quite flat. In this case, the necessary falls and gutters can be formed with rough concrete laid on the top of the main body of concrete. The best material for finishing such roofs externally is asphalt.

Where the usual sloping roofs are required to be fire-resisting, they can be constructed with iron principals carrying L or H iron purlins 4 ft. or 5 ft. apart. Between the purlins oak-breeze concrete can be laid, on which slates can be nailed without the need of wood laths. The slates should be bedded in good lime-mortar.

Domes of concrete have been constructed with and without frameworks of iron, &c. The well-known dome of the Pantheon is of concrete, with a framework of brick.

STAIRS.

Single steps of concrete or artificial stone can be obtained and built into walls, after the manner of stone steps. A better method, however, is to form the whole flight in one mass of concrete by means of framing, as shown in

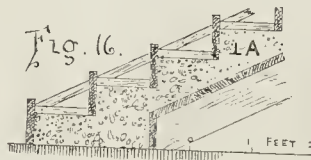


Fig. 16. By means of suitable moulds, the steps can be formed with moulded nosings. The soffits can be made in steps if required, but the continuous slope is best and most easily formed. For stairs not more than 5 ft. or 6 ft. wide, fixed at both ends into walls, ironwork is not required, but for wider stairs a \perp iron should be imbedded in each step from wall to wall, as at A. For open-newel stairs, the free end ought to be strengthened by a rolled-iron joist,

bolted at the top to another joist extending along the free edge of the landing, or by an iron skeleton, consisting of raking piece, and upright and horizontal bars, riveted to the shape of the steps. The treads can be formed with Hawley's patent wood-block treads, or Doulton's silicon treads, &c., or, as is done in many parts of Spain, with tiles kept in position by a stout wood riser. The riser may be finished with cement, or with tiles, marble, wood, &c.

SEWERS.

During Mr. Grant's tenure of office under the Metropolitan Board of Works, several thousand yards of concrete sewers were formed; some were rendered inside with Portland cement and sand (1 to 1), finished ½ in. thick; others were lined with a half-brick ring laid in cement-mortar. The concrete was composed of 1 part cement to 7 parts sand and ballast.

At Buenos Ayres there are from forty to fifty miles of concrete sewers, varying in size from 12 ft. x 14 ft. to 2 ft. 6 in. in diameter.

The manufacture of concrete drain-pipes, begun in America, has been successfully adopted in England. Pipes of this kind, known as "Block-Concrete Tubes," are made at Poole, in Dorsetshire. Others are made by the Imperial Stone Company at East Greenwich, and are known as "Silicified Stone Pipes." They are made in diameters varying from 6 in. to 36 in., the concrete being well tamped or rammed by machinery as the mould is filled. The thickness of the material is about 1 in. per foot of pipe-diameter. As the sockets of the pipes are formed in the thickness of the material, the pipes are more easily and firmly laid than ordinary drain-pipes. In the *Builder* for April 1, 1882, we gave the result of some tests on ordinary stoneware pipes and on "Silicified Stone Pipes," which showed that the latter were about 35 per cent. stronger than the former. Again, stoneware and earthenware pipes are frequently twisted in the firing, whereas concrete tubes can always be made true in section. Less cement is required to form the joints of the latter than of the former, as the spigot and socket of the concrete tubes can be made to fit accurately, while the sockets of stoneware pipes must be made large enough to allow for a certain amount of twisting in the kiln.

Sundries.—Besides the uses of concrete already mentioned, there are several others, such as concrete doors, concrete lintels containing iron rods, concrete blocks of various kinds for fire-resisting floors and for walls. These are, however, special manufactures, and somewhat beside the scope of the present series of articles, which is now brought to a conclusion.

OBITUARY.

MR. JOHN GIBSON, F.R.I.B.A.—We regret to hear that Mr. John Gibson, F.R.I.B.A., F.S.A., died on the 23rd inst. at his residence in Great Queen-street, Westminster, in his 76th year. The cause of death was pneumonia. He was a pupil of Sir Charles Barry, and remained with his master for six years after the term of pupillage (three years) had expired, assisting him in his great work, the Houses of Parliament. Mr. Gibson commenced practice in 1844, and was elected an Associate of the Royal Institute of British Architects in 1849, and a Fellow in 1853. He had filled the office of Vice-President of that body, and in 1850 received, on their nomination, the Royal Gold Medal for Architecture. In the *Builder* for June 21, 1890, pp. 448-449, will be found an interesting account of Mr. Gibson's career, and of his principal works, given by Mr. Waterhouse, R.A., the then President of the Institute, in his address on the occasion of the presentation of the Gold Medal. The following is a list of Mr. Gibson's works which have been illustrated in the *Builder*:—Bloomsbury Baptist Chapel, volume for 1848, page 189; Imperial Insurance Office, Threadneedle-street, volume for same year, page 258; Bodelwyddan Church, near St. Asaph, volume for 1860, p. 657; National Provincial Bank of England, Threadneedle-street, 1865, pp. 835, 908; Dobroyd Castle, Todmorden, 1869, p. 947; National Provincial Bank of England, Newcastle, 1872, p. 786; National Provincial Bank of England, Piccadilly Branch, 1873, p. 487; Window and Grille, National Provincial Bank of England, Newcastle, 1873, p. 366; Nutfield Priory, Surrey, 1874, p. 63; National Provincial Bank of England, Middlesbrough, 1874, p. 155; Todmorden Town Hall, 1875, pp. 301, 324; Saloon and Staircase, Dobroyd Castle, Todmorden, 1875, p. 953; National Provincial Bank of England, Stockton-on-Tees, 1877, p. 661; Chimney Pieces, Nutfield Priory, 1878, p. 1,146; Building for the Society for Promoting Christian Knowledge, Northumberland-avenue, 1879, p. 1,153; National Provincial Bank of England, Sunderland,

* See Paper by Mr. Whateley Elliot in Proc. Inst. C.E., 1890-1, part II.

† See the *Builder* for May 21, 1881.

1879, p. 1,379; and Child's Banking House, Fleet-street, November 27, 1880, p. 646. The funeral took place at Kensal Green Cemetery on Wednesday last.

GENERAL BUILDING NEWS.

PRIVATE CHAPEL, WELBECK ABBEY.—The private chapel of Welbeck Abbey, which has just been erected by the Duke of Portland, was opened on the 11th inst. by the Rev. Dr. Lidington, Lord Bishop of Southwell. The chapel, which has been constructed in part of a long building, formerly the Riding School, and more recently a museum of art, was planned originally by the late John D. Sedding. His death, however, occurred before the work was begun, and the task of carrying out Mr. Sedding's plans was entrusted to his successor, Mr. H. Wilson, by whom the fittings of the chapel have been designed. The building, which is capable of seating about 330, has been divided by a row of marble columns, supporting an alabaster cornice and entablature, into a nave of five bays and two aisles. Two bays are taken up by the chancel. On the north side of the sanctuary, at the end of the aisle, is the vestry, the organ-chamber occupying a corresponding position on the south side. The open timber roof, instead of a recessed one, has been introduced by a plaster vault, with broad semi-circular ribs, over each pair of columns. Each of these ribs is divided into six niches—those in the nave being filled by figures of the Messianic prophets, while that over the sanctuary is filled with adoring angels playing on musical instruments. The altar, placed at the eastern end of the chancel, is flanked and supported by an alabaster figure of St. Andrew and Mr. Wilson, in a silver electrotype from a plaster model representing the message of Christ to the world. The whole frontal is framed in green Devonshire marble, which harmonises with the alabaster roble behind. A silk dossal with side wings depends from the cornice behind the altar and serves instead of a reredos. The seating has been arranged on the conventional system, with two rows of canopied stalls running east and west in the aisles for the inmates of the Abbey and visitors. The nave is devoted to seats arranged in the ordinary way. The stalls are all of walnut, and the floor is laid with tessellated pavement, whilst above the stalls panels of old tapestry have been introduced. The walls are built entirely of marble.

HOME FOR NURSES, EDINBURGH.—A new home for the nursing staff of Edinburgh Royal Infirmary was opened on the 19th inst. The home is situated on the west side of the main corridor connecting the Surgical and Medical departments. It is built in the form of a square with a garden in the centre, and is connected with that part of the Infirmary containing the nurses' dining and reading-rooms by a conservatory. Two stories in height, the building is constructed of red pressed bricks with yellow stone dressings. The internal accommodation consists of 121 nurses' rooms, a sick room with 6 beds, and 2 separate sick rooms, 16 bath-rooms, and a large recreation-room. The building was designed by Mr. Sydney Mitchell, architect, Edinburgh.

RESTORATION OF KIRKSTALL ABBEY.—According to the *Architectural Record*, the work of preserving the ruins of Kirkstall Abbey is steadily progressing. The arches of the south aisle have now been made secure. The more arduous task of re-erecting the fallen portion of the north aisle is not yet quite completed. As far as possible, the old stones have been used, the desire of the architect, Mr. McKie, being to restore the work to its original state from the historical interest of the pile. A thick layer of asphalt has been placed above the vaulting of both aisles. It is necessary that steps should be promptly taken to preserve the tower, which at present is in a rather shaky state. The stonework is crumbling, the lime is falling out, and there are several ugly cracks. The architect has been instructed to make a careful inspection of the tower, and to suggest to the committee means whereby this important part of the ruins may be preserved. The chancel, also, is not as safe as could be desired. The wall of the Abbey facing the river Aire is slightly out of the perpendicular. Considerable improvements are to be made in the Abbey grounds. Tenders have been invited for the work.

NEW CHURCH, BELFAST.—On the 20th inst. St. Barnabas' Church, Donecain Gardens, Belfast, was opened. The building is in the Early English style, with simple treatment of brick and stone. The plan at present consists of nave and chancel, with south aisle, and provision for the addition of north aisle, organ chamber, and spire. The nave is 70 ft. long by 27 ft. wide, and the seating accommodation is now 550, and when completed 220 sittings will be added. The nave is separated from the chancel by a boldly moulded arch, and from the aisle by a series of arches carried over out-stone piers. Ground has been secured for the erection of a north aisle, organ chamber, and spire. The nave stone and marble. The work has been carried out by Mr. Thos. McMillan, contractor, Belfast. Messrs. Purdy & Millard had the execution of the pulpit, font, prayer-desk, and lectern, and Messrs. Musgrave & Co. supplied the heating apparatus. The work has been carried out from the designs

and under the personal superintendence of the architect, Mr. Henry Souver, Belfast.

NEW MARKET-HALL AT TREDEGAR.—This new building, which has been erected on the site of the old market, was opened on the 24th inst. by Mr. J. Colquhoun, J.P. The structure occupies an area 110 ft. long by 60 ft. wide, and contains forty-five stalls. The contractor is Mr. David Davies, of Cardiff, the work being carried on under the supervision of Mr. Taylor, of Cardiff. The architect is Mr. Hitchcock, of Newport.

VILLAGE CLUB, LEXDEN.—Mr. J. W. Start, of Colchester, has been instructed to prepare plans for a village club at Lexden, Colchester, for Captain Naylor-Leyland, M.P.

SANITARY AND ENGINEERING NEWS.

EXAMINATIONS FOR INSPECTORS OF NUISANCES.—At an examination for Inspectors of Nuisances, held at Liverpool on December 18 and 17 by the Sanitary Institute, sixty candidates presented themselves. The written examination was held on the 16th, and the candidates were examined *visu voce* on the 17th. Thirty-seven candidates were certified, as regards their sanitary knowledge, to be competent to discharge the duties of Inspectors of Nuisances.

WATER SUPPLY, ANTIGUA.—Mr. T. Ivor-Moore, C.E., Surveyor to the War Department, is proceeding early in January to the West Indies again, at the request of the Colonial Office, to advise the Colonial Government of the Leeward Islands, in connexion with the water supply of Antigua, &c.

TEIGNMOUTH WATER SUPPLY.—At a special meeting of the Teignmouth Local Board, held on the 13th inst., the Water Committee reported that they had considered the schemes of water-supply proposed by Messrs. Cousins, C.E., and W. W. Minister, and Mr. H. Bertram Nichols, C.E., Birmingham; but as Mr. Cousins's scheme did not supply the high levels by gravitation, they recommended the Board not to entertain it. The scheme of Mr. Cousins was simply one of additional supply, which he proposed to obtain from beyond Okeleigh, leaving the present pumping supply for the high level. Mr. Nichols's scheme, which was elaborated in great detail, was for the supply to be obtained from the Becka Brook at a point below the Becka Falls, about fourteen miles to the northwest of the town of Teignmouth, where he proposed the construction of a storage reservoir capable of containing 30,000,000 gallons. The supply main from the storage reservoir would be laid along the high roads traversing Teigngrace, Kingsteigton, and Bishopsteigton, to the existing high-level reservoir at Hazeldown, which is proposed to be altered and made impervious, to contain 2,250,000 gallons. The population of Teignmouth is about 8,300, but in the summer time is increased to about 12,000, and it is proposed that an allowance shall be made of not less than 28,000 gallons per day. The scheme is estimated to cost 20,000.

NEW SANITARY CLOSETS AT THE WOLSEINGHAM NATIONAL SCHOOLS, CO. DURHAM.—The Sanitary Inspector of the Wensdale Rural Sanitary Authority has lately reported that the completion of new sanitary closets at the National Schools of Wolseingham, within their district. These closets have been erected in one block and under one roof, but consist of two distinct and separate sets, one of three closets, with a urinal, for the boys, and one set of five closets for the girls. They are Doulton's trough closets of sanitary ware, and each set is provided with a Doulton's automatic flushing tank of 75 and 50 gallons capacity respectively. The tanks can be regulated to flush at any desired interval. The closets empty into a chambered drain, which is disconnected from the main sewer by a proper trap, and the closet drain is provided with a fresh-air inlet next the sewer, with corresponding pipe outlet ventilators carried above the roof of the building. The closets have been erected from plans, &c., prepared by the Inspector (Mr. W. M. Egglestone, of Stanhope), and approved of by the Medical Officer of Health (Dr. Devey).

FOREIGN AND COLONIAL.

FRANCE.—M. Achille Hermant has retired, by routine of length of service, from the post of architect to the Department of the Seine. — M. Chabrol, who for the same reason has resigned his post as architect of the Ministry of the Interior, has been replaced at the Palais Royal by M. Guadet, and at the Gobelins by M. Rêdon. — Three large prisons in Paris, Mazas, Ste.-Pelagie, and La Roquette, are to be demolished, and will be replaced by an immense penitentiary to be built at Fresnes, near Paris. The Académie des Beaux-Arts has re-elected M. Grémeau as President, and M. Daumet as Vice-President. — The Municipality of Paris are about to open a fresh competition for the decoration of the grand dining-room of the Hôtel de Ville, the first competition having produced nothing satisfactory. — M. Falignère is now completing the monument to Bizet. The bust of

the composer is placed on a pedestal garlanded with laurel leaves. A youthful figure of a Muse surrounds it with a violin and bow in her hand, and beneath is seated a figure of a Spanish girl in the costume of "Carmenita." — M. A. Joulin, a former pupil of the French school at Athens, has been appointed by the Sultan Curator of the Museum at Constantinople. — The Luxembourg has received two fine drawings presented to it by Mr. Burno-Jones, which were in the Champs de Mars Salon. — M. André, architect, of Lyons, has been commissioned by the Helvetic Confederation to make the necessary studies for the restoration of the Château de Lusame. — Two permanent galleries have been erected in the gardens at Monte Carlo for the annual international exhibitions which are to be established there, the first one to open on January 1 and close on April 15. — There is to be a competition opened at Saint-Florent (Cantal) for the construction of a Hôtel de Ville. — A statue is to be erected at Lunévilly to General Lassalle, who distinguished himself in the wars of the First Empire. — The Municipal Council of Paris has just authorized the construction of a theatre at the Champs Elysées, on the site of the building now occupied by the Marigny panorama. It is intended that it shall be a building of a very decorative character. — The death is announced, at Limoges, of M. Emile Poivat, the oldest of the "romantics" of France. He was eighty-seven years of age and was the last representative of a family of artists who for a long time past had devoted themselves to that branch of art. — The death is announced also, at the age of forty-three, of M. Paul Le Rat, one of the first revivers of etching in France. He had interpreted finely many of the pictures of Manzonier, and also executed a good many remarkable portraits. — We have also to mention the death of Mlle. Félicie Maigret, a pupil of M. Léon Cogniet, who had made a reputation as a painter of portraits.

BERLIN.—The design for a monument which the Rhine province intends to erect in memory of the late Emperor William has been the subject of much local controversy. We hear that it has now been decided to accept the model by the sculptor Professor Huidresdor and the architect Herr Bruno Schmitz. The site for the proposed monument will be near Cohlentz, the cost is estimated at about 25,000. — The Berlin Architekten Verein has this year done much good work for the Berlin municipal authorities, and for the Prussian Government, including the revision of the Berlin Building Act, the preparation of the new Berlin Shuhurban Building Act (just published); the preparation of plans of suitable sites for the proposed International Exhibition; propositions as to the future extension and laying out of Berlin; and, lastly, the examination of several schemes for elevated railroads in Berlin (*Centralbahn der Provinz Pommern*). This year's Schinkel Medal Competition, subject, "Design for Public Baths" shows some improvement as to the number of candidates. There are actually five this year in place of the usual two, one, or none. — In the list of free lectures arranged by the custodians of the Kunstgewerbe Museum, the next one will be Dr. Springer's on "Ordinary and Special Street Decorations." Special street decoration is a subject but seldom treated in the lecture-room, even in Germany, where such decoration generally can boast of *bona fide* artistic or architectural pretensions. — The constant increase of electric lighting in Berlin and the improved mode of using gas as an illuminant are causing some trouble to the municipal gas-works, whose development has thereto come to a standstill. More gas, it is true, is being used for motive power, but when supplied for this purpose it is given at a low rate, and, if anything, is liable to cause a deficit in the finances. The price of gas will probably have to be raised. — The Emperor has approved of the re-election of the twenty-one members of the Prussian Academy of Works, who would have to resign at the end of their three years' term of office. Herr "Ober-Baudirektor" Spicker will be President for the coming three years, and at the same time chief of the architectural revision of this Academy. — The Ministry of Public Works, in conjunction with the heads of all the more important Prussian Government Departments, has issued a new set of Building Regulations, according to which all Government structures (which are exempt from local Building Acts) will have to be carried out in future. Sanitary matters and the diminution of fire-risk have received careful treatment.

SWEDEN AND NORWAY.—The Scanian Cement Company, Malmö, has undertaken the work of constructing the foundations of the New Opera House in Stockholm. The materials to be used are cement and concrete, the contract price of the work being 18,000. It is to be completed by January 1, 1894. — A Swedish engineer, Herr W. Abom, has undertaken a fire-proof paint which has recently been tested in Stockholm with the most satisfactory results. — The first prize, 8,000 kr., offered for the best plans for improving and enlarging the harbour at Malmö to which we have already referred — has been awarded to Herr Kummer, of Danzig, Government and Building Councillor. — The committee appointed to select the best design for a

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Table with columns: Nature of Work, By whom Advertised, Premium, Designs to be delivered.

CONTRACTS.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

CONTRACTS.—Continued.

Table with columns: Nature of Work or Materials, By whom Required, Architect, Surveyor, or Engineer, Tenders to be delivered.

PUBLIC APPOINTMENTS.

Table with columns: Nature of Appointment, By whom Advertised, Salary, Applications to be in.

Those marked with an Asterisk (*) are advertised in this Number. Competitions, p. iv. Contracts, pp. iv., vi., & viii. Public Appointments, p. xix.

monument of Tordenskjold, "Norway's Nelson," have signed contract for its execution with Herr Ender, a young and almost unknown sculptor, and the statue is to be ready for casting by the end of 1894.

VIENNA.—Owing to malpractices in the usage of the words "architect" and "engineer" in a titular sense, the Government has now been requested to pass a Bill limiting the adoption of these words as prefixes to the names of duly qualified practitioners in the professions concerned.

MISCELLANEOUS.

GROOVED PAVING BRICKS.—Mr. T. P. Baylis, of Redditch, sends us a small model of a paving brick made with a groove along one side and one end, and a corresponding tenon along the other side and end.

value in the method, because if there were any failure of the foundation which would give room for subsidence, any such weight as a horse and carriage would certainly break the tenon.

JUBILEE OF AN ALLOA BUILDER.—Mr. A. L. Mitchell, builder, Alloa, has been entertained by his fellow-townsmen at a banquet in celebration of his jubilee in business.

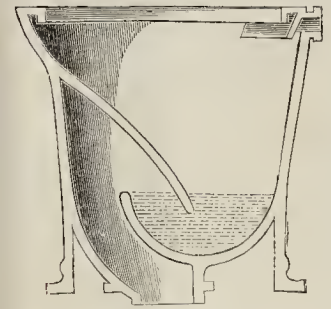
NEW PULPIT, MANCHESTER CATHEDRAL.—A new pulpit was recently presented to the Dean and Chapter of Manchester Cathedral by Mr. Chancellor R. C. Christie.

heads of the statues are carried canopies, while the whole of the cornice is worked out in battlement design. The staircase of nine steps, of York Greenstone stone, is composed of variegated alabaster, filled with tracery work.

HUMPHREYS, LIMITED.—In the first annual report of this Company, submitted at the annual general meeting held on the 21st inst., the Directors congratulate the shareholders on the steady and satisfactory progress which they have been able to carry on during the year 1892 in this old-established business.

BELLS.—We understand that Mr. C. Carr, of Smethwick, has secured the contract for re-banging the eleventh bell in the old peal of twelve at Christ Church, West Bromwich, and a large bell, &c., complete, for a new church at St.rommes, in the Orkney Islands.

THE "CHAMPION" COMBINATION CLOSET.—The water-closet pan which is made under this name by Messrs. Wright, Sutcliffe & Co., of Halifax, appears to be intended to provide for one desideratum to which we alluded in a "Note" the other day,—the utilising of the water as to produce the strongest cleansing flush in proportion to the amount of water used. We have not seen the closet in action, but from the accompanying section it appears that



a directing piece is used just at the water inlet to direct a considerable portion of the flush right into the centre of the trap, so as to ensure an efficient scouring of it. To direct the water so as to get the strongest scour out of it ought always to be an object, though often overlooked; we do not of that number, however, agree with the makers in thinking that a two gallon flush is sufficient with their closet, but it will probably be better with that amount of flush than many others. Two gallons of water is, as we have already observed, less than ought to be allowed, even with the most efficient form of flush.

PROPERTIES FOR SALE.—In the course of next Spring, Keldy Castle estate, in the North Riding of Yorkshire, consisting of nearly 8,000 acres, whereof about 1,850 are arable, 4,000 hill, vale, and common land, richly wooded, with moorland, 2,000 grass and pasture, and 670 wood, planted with larch, spruce, and Scotch fir. The west side of the property extends into the beautiful vale of Rosedale, where the priory was founded *temp.* Richard I., for Beneficent uses, and was at the Dissolution of the latter, 1536, yearly. Near the church are Hallgarth-hill, having a trench around its base, and other ancient earthworks, supposed to be of Roman origin.—At the Mart, on January 24, Nos. 24-5-6-7, Cornhill, freehold, covering an area of about 3,000 ft. superficial, and with return frontages of 90 ft. and 100 ft. to Change-alley. It was in the powdering closet of Eldridge, a wig-maker, in Exchange-alley, that the memorable fire broke out, in March, 1748, which in the course of twelve hours consumed the Three Tuns, with Tom's and the Rainbow coffee-houses, Cornhill, and the Marine and Pennsylvania coffee-houses, most of the George and Vintners, and Jonathan's, Garraway's, the Jerusalem, the London Insurance Office, with White Lion-yard and court, the fire extending eastwards as far as St. Michael's-alley and George-yard.—On January 18, at the Mart, the freehold of Nos. 11-12, Cornhill, with an entrance from Lombard-street, built in 1854 by Holland & Hannen, and standing on 2,700 square feet of ground. The last named property is at present occupied by the Goldsmiths' Alliance, who are prepared to vacate possession in due course. It is not often that such commanding premises of this extent in the City are placed in the market.

PROJECTED SUBWAYS IN STOCKHOLM.—The Chief Engineer of the Stockholm Board of Works has submitted a proposal to that assembly to commence, in order to find work for the unemployed, the construction of various subways in the Swedish capital, such as exist in London and other cities. The advantages of the same are duly accentuated in the proposal.

THE ENGLISH IRON TRADE.—Owing to the Christmas holidays there has been little attention to note in the iron trade. Prices generally remain unchanged. In crude iron little is doing. Finished iron is very quiet, whilst pig-iron continues in a dull condition, although values are very firm. Steel shows little change in most departments, inactivity still being the rule. Shipbuilders are moderately engaged; but engineers are poorly employed. The coal trade shows little change.—*Iron.*

MEETINGS.

SATURDAY, DECEMBER 31. Sanitary Inspectors' Association.—Visit to the Museum of Sanitary Appliances, Hornsey. 4 p.m.

WEDNESDAY, JANUARY 4. British Archaeological Association.—(1) The Rev. J. Cave Brown on "Beading Church." (2) Mr. H. Ser Cuming, F.S.A. Scot., on "Old Traders Signs in Little Britain." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting, 8 p.m. Institution of Civil Engineers of Ireland (Dublin).—Breuing meeting in the New Hall, 53, Dawson-street.

THURSDAY, JANUARY 5.

Dunedin Institute of Architecture.—Mr. A. H. Miller, F.R.S., Scot., on "Curiosities of Architecture in Dunedin." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

32,662.—GAS FITTINGS: T. R. Anderson.—This invention relates to improvements in gas fittings, its object being to lessen the waste of gas. It is especially applicable to the lighting of offices, workshops, &c. It consists in applying a valve to the gas pipe or cock in such a manner that by simply giving it a slight push the light is lowered, the requisite amount without having to touch the key.

458.—SEWERS, PIPES, &c.: T. Wilkinson.—This invention relates to a cheap and simple method of soundly joining together lengths of earthenware, ceramic, cement, concrete, and other pipes, such as are generally employed for sewers, drains, and the like. In the face, at each end of a pipe-length, is provided a groove, so that when two pipe-lengths are brought together, face to face, their grooves coincide, and preventing any leakage of fluid. A convenient way of making the joint is to bed the hoop with cement in the groove of the one pipe and the other pipe, such as there may be provided at the ends of the pipe-lengths, and preventing any leakage of fluid. A convenient way of making the joint is to bed the hoop with cement in the groove of the one pipe and the other pipe, such as there may be provided at the ends of the pipe-lengths, and preventing any leakage of fluid.

657.—WATER AND GAS PIPES: R. G. Thwaites.—The object of this invention is to prevent the freezing, indoors, of water-pipes. This is effected by a continuous circulation of the water in the cistern by connecting what is called the "outlet" pipe to a boiler having a pipe connecting it with the cistern, the water from the cistern being fed to the cylinder and boiler and up to the bath or lavatory in the ordinary way. The pipe, having led the groove of the other pipe with cement, to press the two pipes together, thus forcing the projecting half of the hoop into the cement of the other groove.

14,196.—WATER-CLOSETS: R. Eckstein and H. Gabriel. This invention relates to a protective covering for the seats of water-closets and the like, the use of which prevents the body coming in contact with the seat when the closet is being used. The covering consists of waterproof antiseptic material, such as parchment paper, and is of such a form and size as to extend beyond the body coming in contact with the seat, thus forming a protection for the lower parts of the legs. Sheets of ordinary closet paper, which are suitably perforated so that portions of the proper size may be readily torn off, are attached to the front of the protective covering.

17,593.—WINDOW-FRAME POCKETS: P. V. Phillips.—This invention relates to improvements in window frame pockets, and the method of making the same. It consists in (1) a pocketed window-sill and pocket-piece formed of the same board, the sill opening and pocket-piece joining at one or both ends in an indirect dividing line, comprising two offset transverse cuts extending inwardly from the opposite faces of the stile to a plane between the said faces and a vertical fracture extending from one of the cuts to the other; (2) A pocketed window-sill and pocket-piece formed of the same board, the sill-opening and the pocket-piece having interlapping surfaces at their upper ends, and having at the top of the stile an indirect line of division, which comprises two offset transverse cuts extending inwardly from opposite faces of the stile to an intermediate vertical fracture connecting them; and (3) In the method of making the pocket in a window-sill consisting in cutting the stile inwardly part way through from opposite faces, and in different planes, and then splitting the wood from one cut to the other.

NEW APPLICATIONS FOR LETTERS PATENT.

December 12.—22,772, J. Jones and J. Rawson, Window-sash-fastener, with Rattling Preventer.—22,784, J. Gaskell and W. Robinson, Artificial Stones, Bricks, Tiles, &c.—22,790, J. Marshall and John Weston, 22,802, W. Wilberck, Preventing the Slipping and Rattling of Window-sashes, &c.—22,811, J. Goodman and F. Stone, Tops or Gnarls of Chimneys and Ventilating Shafts.—22,842, A. Throver, Girders.

December 13.—22,861, J. Holden, Damp-proof Bricks.—22,869, Fifth Avenue, Electrical Fittings.—23,392, J. Dean, Water-closets.—23,908, J. Horrocks, Cisterns for Water-closets.—23,910, H. Jaretski, Construction of Buildings.

December 14.—22,828, D. Baron, Inlet and Outlet Ventilator.—22,989, D. Baron, Ventilating Rooms and Buildings.—23,026, G. Clarke, Stays for Casements, Fanlights, Skylights, &c.—23,030, E. Busch, Stones.

December 15.—23,056, J. McKenzie, Chimney-cowls.—23,065, W. Abbott, Siphon Flushing-cisterns.—23,080, J. Hunt, Roof-gutters and Valleys.—23,088, W. Smith, Protecting Timber Structures from Sea-worm.—23,102, J. Manklyn, Collared Locks for Water-closet Doors.—23,108, S. Beard, Construction of Glass-roofs, skylights, &c., and metal bars for same.—23,110, C. Darrah, Automatic Flushing Apparatus for Closets.—23,111, C. Darrah, Flashes.—23,131, H. Brasley, Panels for Doors and Decorative Purposes.

December 16.—23,142, J. Porter, Sash-fasteners.—23,176, F. McIlvenna and others, Mounting Sash-frames, Ventilators, &c.—23,181, J. Hambley, Jun., Paving Bricks.—23,235, O. West, Filling of Sluices.—December 17.—23,257, F. Shibley, Automatic Window-sash-fasteners.—23,263, S. Gratrix, Jun., and Bro. and H. Brockley, Flushing Water-closets.—23,314, D. Dyren and J. Didon, Sliding-doors and closing same.

PROVISIONAL SPECIFICATIONS ACCEPTED.

19,606, J. Inwood, Water-light Skylights, Conservatories, &c.—20,745, J. Milton, Set Squares, 21,064, H. Lockwood, Composition for Flooring or Covering Iron Bridges, Arches, &c.—21,070, J. Cathrein, Locks for Doors.—21,283, H. Moreton, Scouring Glass in Windows, &c.—21,458, W. Dalton, Bakers' Ovens.—21,810, J. H. Tomlin, Circular and Other Saws.—22,110, J. Taylor, Bricks for Building Purposes.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

2,642, W. Shaddock, Protection of Wood, Granite, or other Pavements in Roadways and Tramways.—2,814, P. Hüllinghorst, Roofing Shingle.—15,715, S. Kirk, Windows with Combined Sliding and Hinged Sashes.—20,149, H. Lake, Composition for Covering Walls.—20,414, P. Moreau, Variegated or Veined Artificial Stone and Imitations of Natural Marble.—20,655, W. & J. Oakes, Kilns for Bricks, Lime, &c.—20,832, E. Von Hunsdorff, Bricks or Blocks for Building Purposes.

ESTATE EXCHANGE REPORT.

DECEMBER 15.—By W. Brady: 9 and 10, 115, Humboldt East, Blackheath, ut. 77 yrs., at 104. 15s. 5d. DECEMBER 10.—By Curtis & Sharp: 103, Kersey st., Poplar, 1, 1897, 29, Dorset st., Lincolnshire, sold privately. DECEMBER 21.—By Bedford & Co.: No. 39, Stamford-hill, c. 2,920. (Contractions used in these lists.—R.g. for freehold ground-rent; l.g. for leasehold ground-rent; i.g. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for estimated rent; n.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; cr. for acre; sq. for square; pl. for plot; ter. for terrace; cre. for crescent; yd. for yard, &c.)

PRICES CURRENT OF MATERIALS.

Table with columns for 'TIMBER' and 'METALS'. It lists various materials like Greenheart, Teak, Oak, Pine, and different types of iron and steel, along with their prices per unit.

TENDERS.

Next week.—As it is our intention to go to press a few hours earlier than usual next week (when we shall publish our "Jubilee" Number), all communications for insertion under this heading must reach us by 6 p.m. on Wednesday.

ALTRINCHAM.—Accepted for levelling, paving, &c., Altrincham, Ashton-under-Lyne, for the Royal Sanitary Authority. Mr. J. M. D. M'Kean, surveyor, Broadfield-road, Peel-cave way, Hale, near Altrincham. George Town, Sale. Estimate—£294 0 0

BOURNEMOUTH.—For the construction of roads, Brankstone Tower Estate. (No. 2 contract.) Messrs. H. E. Hawker & Mitchell, surveyors, St. Peter's-church, Bournemouth. Estimate—£10,000. Bradshaw & Co. Estimate—£2,252. Sandlers & Co., Bourne. Estimate—£800. 2,257. Moston. Estimate—£1,402. W. H. H. Estimate—1,850. T. H. Estimate—1,880. S. H. Estimate—1,855. B. H. Estimate—1,347. N. H. Estimate—1,481. Accepted, being contractors for the premises roads.

BRIGHTON.—For the erection of board-roof and offices, Prince-street, for the Brighton Guardians. Messrs. Noon & Hunt, surveyors, 129, Queen's-road, Brighton. Estimate—£12,860. S. H. Estimate—£11,193. W. A. Estimate—£12,860. G. H. Estimate—£2,257. Moston. Estimate—£1,402. W. H. H. Estimate—1,850. T. H. Estimate—1,880. S. H. Estimate—1,855. B. H. Estimate—1,347. N. H. Estimate—1,481. Accepted, being contractors for the premises roads.

CAREPHILL.—For the erection of a dwell-house, for Mr. Weeks, Messrs. Barton & Williams, architects, 15, Queen-street, Ipswich. Estimate—£260 16 8. W. H. Estimate—£238 0 0. E. H. Estimate—£55 0 0. W. H. Estimate—£24 0 0. J. H. Estimate—£19 0 0. H. H. Estimate—£29 0 0. Accepted.

CLICKHEATON—Accepted for the erection of six pillars, bases, vine-steeple, for Mr. Chas. Kelson, architect. Mr. W. B. Howarth, architect, Old Bank, Clifton, Clifton, Bristol.

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CLYDE—For erecting the administrative block of the isolation hospital, for the Corporation of Glasgow. Messrs. Walker, Barrach, Engineer, Quantities by Messrs. Franklin & Andrews.

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DROMIN (Inland)—For improvements &c., Dromin Church, Mr. J. Doherty, C.E., architect, Dromin, Killybeggs, Ireland.

GALLEYWOOD (East)—For the erection of a villa-residence at Galleywood, Mr. R. Shawdon, architect, Chelmsford.

GREAT CLACTON (East)—For kerling, channelling, &c., Church-road, &c., for the Local Board. Mr. A. R. Robinson, Surveyor, Clacton-on-Sea, Clacton-on-Sea.

HALIFAX—For the erection of four houses, Old Church, Lightcliffe, Mr. J. F. Walsh, architect, Waterloo Chambers, Halifax.

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LINCOLN—For the conversion of premises at the corner of High-street and Goulbourn-street into a head bank office for the Lincoln and Lindsey Banking Co., Ltd., Mr. W. Watkins, architect, Lincoln. Quantities by the architect.

LINCOLN—For the erection of a girls' middle-class school for the Governors. Mr. W. Watkins, architect, Lincoln. Quantities by the architect.

LLANDAFF—For the erection of a factory at Llandaff, for the Match Manufacturing Company, Limited, Cardiff. Mr. J. P. Jones, architect, 25, Park-street, Cardiff. Quantities supplied by the architect.

LONDON—For the erection of proposed general offices, work-rooms, resting-rooms, &c., for the Corporation of the Poplar Union. Messrs. Walter A. Hills & Son, architects, 149, Bury-street, E.C. Quantities by Mr. Henry Pevsley, 39, Lombard-street, E.C.

LONDON—For the erection of proposed general offices, work-rooms, resting-rooms, &c., for the Corporation of the Poplar Union. Messrs. Walter A. Hills & Son, architects, 149, Bury-street, E.C. Quantities by Mr. Henry Pevsley, 39, Lombard-street, E.C.

LONDON—For the destruction and removal of brick sewer and the construction of a new pipe sewer, with manholes, &c., Church-street, E.C., for the Vestry of St. Leonard, Southwark. Mr. A. J. Smith, surveyor, Tower Hill, Southwark, E.C.

LONDON—For the destruction and removal of brick sewer and the construction of a new pipe sewer, with manholes, &c., Church-street, E.C., for the Vestry of St. Leonard, Southwark. Mr. A. J. Smith, surveyor, Tower Hill, Southwark, E.C.

LONDON—Accepted for renovations to the Mile-end Vestry-hall and Offices, Mile-end-road, E. Messrs. Baker, Mile-end-road, E.

LONDON—For repairs to 156, Old Kent-road. Mr. R. Maswood, architect, Chislehurst.

MALDON (East)—For the erection of offices in the High-street, for Messrs. Ottewill & Son. Mr. F. M. Beaumont, C.E., architect, Malton, Evesham.

NEWLYN (Cornwall)—Accepted for the erection of an ice-house, Plymouth, for the Newlyn Ice and Trading Company. Mr. Oliver Colwell, archt. Penzance.

WALTHAMSTOW—Accepted for alterations, &c., to the "Chequers" public house, Horse-test, for Messrs. Thomas Br. Brown, Lee & Pate, architects, Walthamstow.

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